AMERICAN GAS ASSOCIATION MONTHLY

Gas Used Throughout Model House on Fifth Avenue

ROSE MARY FISK

Gas Detection Instruments

S. S. TOMKINS

Pending Utility Legislation

RAY GARRETT

165 House Heating Jobs A Day in Chicago

PAUL A. JENKINS

Pittsburgh Sells 14,127 Space Heaters in 24 Days

GEORGE W. RATCLIFFE

Home Service Helps To Build and Hold Load in Philadelphia

December, 1933

Your Customers will like

MOVIES About Gas

In any well-rounded advertising program motion pictures can play a valuable part. Here are three pictures that visualize the impressive development of the gas industry—

- ***Nature's Perfect Fuel***

  Is a dramatic description of natural gas. It shows wells coming in, and scenes of the construction of great pipe lines. Location of fields and pipe lines in the United States is shown by animation.

- ***Ideal Fuel***

  This is a vivid picture of the manufactured gas industry. It portrays the industry's progress and development, and the uses of gas in the home and factory.

- ***How Gas Is Manufactured***

  Here is an educational film. Through animation the audience learns how coal gas and water gas are made.

These fifteen-minute reels are available on a PURCHASE or RENTAL basis, and may be had in either 16 mm. or 35 mm. size on non-inflammable stock. We will be glad to tell you more about them.

ADDRESS

AMERICAN GAS ASSOCIATION
420 Lexington Avenue, New York, N. Y.

AMERICAN GAS ASSOCIATION MONTHLY

VOLUME XV | DECEMBER, 1933 | NUMBER 12

CONTENTS

PAGE

The All-Gas House on Fifth Avenue 486

Gas Used Throughout Model Home 487
ROSE MARY FISK

165 House Heating Jobs a Day in Chicago 489
PAUL A. JENKINS

Pittsburgh Campaign Sells 14,127 Space Heaters in 24 Days 493
GEORGE W. RATCLIFFE

Gas Makes Fewer Chimneys for Them To Sweep 496

Safety Precautions During Repair of High Pressure Gas Mains 499
FRED F. DOYLE

Protective Relief and Gas Shut-Off Devices for Domestic Water Heater Tanks 501
HARRY W. SMITH, JR.

Taking Part in Association Work 505
W. E. DERWENT

Convention Calendar 505

Pending Legislation Concerning Utilities 506
RAY GARRETT

Pittsburgh Domestic Appliance Show Features Industrial Gas Exhibit 509
H. J. WILLIAMS

Home Service Helps To Build and Retain Load in Philadelphia 510

Gas Detection Instruments 511
S. S. TOMKINS

Monthly Summary of Gas Company Statistics 520

Consolidated Gas Advertising in New York Again Merits High Award 522

Associations Affiliated with A. G. A. 523

Personnel Service 524

The Association does not hold itself responsible for statements and opinions contained in papers and discussions appearing herein.

Published Monthly by the
AMERICAN GAS ASSOCIATION
Publication Office, American Building, Brattleboro, Vt.
Editorial Office, 420 Lexington Ave., New York, N. Y.

Entered as Second Class Matter at the Post Office at Brattleboro, Vermont, February 10th, 1922, under the Act of March 3, 1879.

Subscription Rate . . . . . $3.00 a Year

The All-Gas House On Fifth Avenue

Mattie Edwards Hewitt Photo.

The "House of Years" in New York where gas is used for all major equipment in a dramatic presentation of interest to the entire industry.

AMERICAN GAS ASSOCIATION MONTHLY

Allyn B. Tunis, Editor

VOLUME XV | DECEMBER, 1933 | NUMBER 12

Gas Used Throughout Model Home

By Rose Mary Fisk

Director, Merchandising Service
House & Garden

THE most-talked-about and most-visited house in New York is an all-gas house.

A country home on Fifth Avenue is something of a paradox. Yet there it stands on the first floor of the W. & J. Sloane store—a full-size, two-story house, completely furnished, equipped and landscaped. The house reflects the most significant trends in domestic architecture, interior decoration and equipment. It is especially interesting, therefore, to find gas used in all heating equipment and in the major kitchen equipment. Gas was selected because modern gas appliances are dependable, efficient and thrifty.

"The House of Years" is the name given to this unique presentation, and it comes as the second chapter of a story that began last year. A year ago W. & J. Sloane, for many years purveyors of fine home furnishings to New York's first families, displayed on their first floor a single-story country house, built to demonstrate that "Beauty can dwell in a small space." The house was illustrated and described in *House & Garden,* created an overwhelming amount of interest, and in the course of the six months during which it remained on view, drew more than 300,000 visitors.

A. G. A. Cooperates

So successful was the first house that this year, again with the cooperation of *House & Garden,* Sloane's embarked upon a more ambitious venture, which received its first public presentation in the October issue of *House & Garden.* The present house occupies two stories, and as its name implies, is "made from the beauty of the past for today and for countless years to come." The first house was a house for youth; the new house is one which a family of fine taste and high living standards can adopt with lasting satisfaction.

While it is the gas equipment, installed with the cooperation of the American Gas Association, that is of most immediate interest to members of the gas industry, the House of Years has many unusual features that recommend it as an outstanding achievement. Most model rooms and model houses in stores stop with a presentation of furniture and accessory merchandise. But the Sloane house reflects a more fundamental approach. This is a real house, in which the furnishings and decoration are carefully related to the architectural plan. Moreover, this house demonstrates that eye-appeal—beautiful furniture, distinguished fabrics, gracious accents—is effective only when the mechanics of the house are up-to-date, smooth-running and efficient. It presupposes that a family of means and taste is just as much interested in the latest and best heating, cooling and cooking equipment as in Chippendale furniture and beautiful silver. What gives a "living" character to the Sloane house, a character that attracts as many as 5,000 visitors a day, is the fact that along with a beautiful exterior and interior are displayed mechanical aids that make for comfort, sanitation and efficiency.

The general architectural style of the house, as conceived by Henry Otis Chapman, Jr., and Harold W. Beder, architects, is Regency, chosen because it is one of the traditional styles whose simplicity and dignity recommends it to present-day tastes. The interior decoration, planned by Ross Stewart of Sloane's, is a mingling of several traditional styles, of which the late Eighteenth Century and Nineteenth Century schools predominate. The visitor who passes through the gay red lacquer front door steps first into an

Mattie Edwards Hewitt—Photo.

Kitchen in "The House of Years," New York, featuring the Electrolux Refrigerator and Oriole gas range

oval entrance hall. Thence the route leads through the library, in the Empire and Biedermeier taste, to the spacious living room, with its silver-papered walls, Chippendale furniture and hospitable game alcove, through the modern Regency dining room, and so to the serving pantry and kitchen. To this last-named room we shall return.

Kitchen Beauty and Efficiency

Upstairs are the master bedroom, boudoir, guest room, young daughter's bedroom and two bathrooms. Leaving the second floor, the visitor descends by an outer staircase, passes through the garden to the summer house. Here, since it was not feasible to place a cellar beneath the house, the heating equipment is displayed. Every visitor must pass through the summer house upon leaving the exhibit.

No feminine visitor to the House of Years can refrain from exclaiming over the beauty and efficiency of the kitchen. This room is large but not too large for quick and comfortable operation. The equipment is arranged to concentrate work and conserve energy. Walls of lustrous Carrara glass, built-in steel cabinets, sink and working tops of stainless monel metal are evidences of the latest trend in kitchen planning. All the latest gadgets, cooking equipment, tools, even foodstuffs neatly arranged on the shelves, contribute to the lived-in look of the kitchen.

Two impressive examples of gas equipment are important elements of the kitchen. The Oriole gas range, designed by Norman Bel Geddes for the Standard Gas Equipment Corporation, marks a new "high" in improved appearance and efficiency. Once one has examined this streamline, functional design, the old style gas range looks hopelessly antiquated and clumsy. In the new model a designer has brought the combined talents of an artist and an engineer into play, and has provided a range that is as handsome as it is practical and economical in operation. The porcelain enameled case has doors set flush, rounded corners, no protuberances or crevices to catch dirt and grease. Heat control is instantaneous and exact. Extra insulation makes for a cooler kitchen, lower gas bills.

Mattie Edwards Hewitt—Photo.

A corner of the kitchen in "The House of Years"

Dramatic Presentation of Gas

The air-cooled Electrolux provides modern refrigeration for the House of Years. The elimination of all moving parts means absolute and permanent silence, so that there is a quiet as well as a cool kitchen. Low operating cost is again a feature.

In the summer house at the rear of the garden are placed the important items of heating equipment. If the feminine visitors to the House "oh" and "ah" over each new wrinkle in the kitchen, it is the heating display that their husbands—of whom thousands are included among the visitors—study and examine. The H. B. Smith Company contributed the boiler, as well as the radiators throughout the house. A Janitrol gas-firing unit is supplied by the Surface Combustion Company. The water heater is one of the Ruud "Quality Three," of which an interesting feature is the automatic storage water heater which allows the customer to control his own gas bill. For the simple, sanitary and orderly disposal of garbage, the gas-fired Kernit has been supplied by the Kerner Incinerator Company.

Thus, the most dramatic and beautiful model house in the country is in truth an all-gas house, promoting the use of gas for all major equipment, in a dramatic presentation that is of interest to the entire gas industry.

Thousands Are Told About All-Gas House

To capitalize throughout the country this service of gas in the House of Years, the Association inserted a full-page advertisement in the October issue of *House & Garden*. Special copies of this issue were distributed to 5,000 brides-to-be and to department store household equipment buyers in every State.

Mattie Edwards Hewitt—Photo.

Janitrol gas heating plant, Ruud gas water heater and Kerner gas incinerator in "The House of Years"

165 House Heating Jobs A Day in Chicago*

By Paul A. Jenkins

TEN weeks ago, on July 19, began the gas house heating campaign which I have been asked to describe. Since that date in the territory supplied with gas by The Peoples Gas Light and Coke Company, Public Service Company of Northern Illinois and Western United Gas and Electric Company, about 10,000 jobs have been sold. This more than doubles the number of house heating installations.

This tri-company campaign was made possible by a reduction in gas house heating rates on July 1 which brought the cost of gas for home heating to a little less than half the cost of 1930-1931 heating season. Here, in Chicago, the present house heating rate is 7 cents per therm for all over the first 26 therms, which cost $4.37. The gas sold by these three companies is an 800 B.t.u. gas consisting of an approximately half-and-half mixture of manufactured gas and natural gas from the Texas Panhandle field.

Whatever success has been achieved in these first ten weeks of a campaign that is scheduled to last through next year may be ascribed in large part to use of a selling plan carefully fitted to the requirements of the market, without regard to established company selling routines.

Preliminary studies of the Chicago metropolitan area as a market for gas fuel disclosed that there are about one-quarter of a million single residences and two-flat buildings which might be considered our market. With such a large number of potential buyers and with gas rates reduced to a point where gas can compete successfully with oil, coke and coal, it was decided that the stage was set for a mass merchandising campaign. Previous conceptions of gas as a luxury fuel for the moneyed few were discarded and it was determined to sell gas as the logical fuel for any householder who wanted his basement to be as modern as his kitchen and the other parts of his house.

Gee!
..it's great to get up in the morning when you use Gas Heat
To prove that every home can now afford to heat with gas, we install it at our expense, remove it at our expense if you don't like it.
NEW LOW COST GAS
YOU INVEST NOTHING!
DON'T DELAY—MAIL THE COUPON
House Heating Division
THE PEOPLES GAS LIGHT AND COKE COMPANY
Public Service Company of Northern Illinois
Western United Gas and Electric Company

Typical newspaper advertisement used in Chicago House Heating Campaign

So to gas at the new low rate was added a gas conversion burner at a standard price of $149.50 to comprise the merchandise that we were to sell to this mass market.

It was felt that the first step toward making our goods look attractive was a radical simplification of the sales proposition which entailed elimination of all unnecessary engineering and merchandising complexities.

The longest single step in this direction was the conception of a "standard package," as we call it, which is any one of a number of approved makes and models of conversion burners rated up to 240,000 B.t.u. hourly input. These burners, complete with hand-operated thermostat and all necessary controls, are adequate to serve about 85 per cent of all of our potential jobs, and consequently it is on this standard package that our sales activity has focussed.

A simple contract form is used, the face of which is no more complex than the usual merchandise order blank. It shows the price of $149.50 and it shows the terms which are, briefly, $3 a month rental during the nine heating months of the first or trial year,

* Address delivered before Commercial Section, American Gas Association Convention, Chicago, Ill., Sept. 27, 1933.

and purchase installments of $3 per month or more thereafter. The agreement may be terminated by the customer at any time during the first year. If not so terminated, the rental contract becomes a purchase agreement. No down payment is required. If the customer keeps the burner, the rental he has paid applies on the purchase price.

For newspaper advertising purposes the offer is boiled down to this statement: "Installed in your home at our expense. . . . Removed at our expense if you don't like it!"

Such was the simplified proposition that we started to sell to the public of the Chicago region on July 19 through a specially recruited organization of 270 salesmen, sixty heating engineers and fourteen sales directors. Direction of the Campaign is in the hands of a headquarters staff located in The Peoples Gas Building.

Our original analysis of the problems involved in merchandising our proposition to this mass market indicated that the best plan would be to use salesmen of the canvasser type, whose activities would be closely supervised by experienced house heating engineers in the ratio of about five salesmen to each engineer.

Accordingly, early in July we advertised for salesmen with door-to-door and general specialty selling experience, and about 300 were put into school a few days in advance of the campaign. The schooling lasted for four days and included a great deal of background material, but only enough technical information to enable the salesmen to make a preliminary estimate of heating cost on the simplified, but scientifically accurate, calculation form provided.

These preliminary estimates are turned into the salesmen's heating engineer who goes back to the customer and makes a thoroughgoing survey of the customer's premises in order to check the first estimate and confirm the sale.

As a matter of fact, the heating engineer's duties under our setup include much more than verification of the preliminary estimate. His duties, in brief, are to see that each job is competently and accurately engineered from start to finish, the instructions being as follows:

1. Survey the building to determine heat losses and make estimate of the fuel requirements according to actual construction factors and accurate measurements.
2. Estimate the cost of gas heating for a normal heating season, taking into consideration all conditions which have a bearing upon the fuel requirements, and the gas rate.
3. Survey the heating system generally to determine if adequate to supply heat losses.
4. Survey the boiler or furnace to determine if adequate and in proper condition to supply the necessary heat to the system.
5. Specify the proper conversion burner equipment for a successful gas heating application.

Still Going Strong

At the end of October, the total number of house heating jobs reached in the Chicago campaign exceeded 13,000 and the sales drive still was in full swing.

Draperies and walls stay clean!
when you heat your home with Gas
To prove that every home can afford to heat with Gas . . . we will install it at our expense and remove it at our expense, if you don't like it.
NOW—
Low Cost Gas Heat
for
STOVE-HEATED
Homes,
Flats and Stores
House Heating Division
THE PEOPLES GAS LIGHT AND COKE COMPANY
Public Service Company of Northern Illinois
Western United Gas and Electric Company

The coupon is a part of each newspaper advertisement used in Chicago to promote house heating

STEAM HEAT FOR RENT
In Homes, Offices or Stores—for a Single Room or an Entire Building
This is the Gasteam radiator—each one an independent steam heating unit.
Gasteam Radiators serve
1 Buildings without a central heating plant.
2 Buildings with a central heating plant, for that "cold room."
Mail the coupon—learn how easy it is to rent steam heat.
GAS-BURNING steam radiators can now be installed in your home, office or store on a liberal rental plan. Now at last owners and tenants can try gas heat in buildings without a central heating system, or for "helping out" in parts of a building not comfortably heated by the central heating plant. Our new illustrated booklet tells the whole story and gives exact heating costs.
No down payment
We will install one or more Gasteam radiators without a cent down payment. Once a month during the heating season (seven winter months) you pay a small rental charge—as low as $1.00 per radiator. It is included with the bill for the gas you use. Take advantage of this offer. Banish the mess and fuss of building fires, hauling coal and ashes. It costs so little to have the comfort of gas heat all winter long. Gasteam radiators are simple to use. Just turn a valve and light it. Certainly easier than tending an old-time stove. You get heat, plenty of it—when you want it—where you want it. Each radiator is an independent steam heating plant. One hundred thousand now in use.
Quickly installed
Learn all about Gasteam radiators and our liberal rental plan. They are quickly installed, just when and where you want them. Now—today—mail the coupon for the illustrated booklet.
THE PEOPLES GAS LIGHT and COKE CO.
122 South Michigan Avenue
THE PEOPLES GAS LIGHT AND COKE COMPANY
122 South Michigan Ave., Chicago, Ill.
Please send me your booklet on Gasteam radiators.
Name
Address
City
Please No.

In their house heating campaign the Chicago companies have not overlooked the demand for auxiliary heaters. The above newspaper advertisement shows how the bid is being made for this business. Good results were achieved in this field in October

We believe that the final success of our campaign depends to a large extent on the conscientious work of these heating engineers. They represent the management viewpoint, and we feel confident that through their corrective influence we shall continue to obtain a large volume of sales from the sales force without sacrifice of technical standards.

The greatest emphasis in our schooling of the salesmen was upon the necessity for a thoroughgoing presentation of the proposition to every qualified prospect. It was felt, and we still feel, that one of the hazards in a no-money-down, year's-trial offer of this kind was that certain of the more aggressive salesmen would abuse the offer, and get many contracts signed that did not represent a customer thoroughly informed of the advantages of gas heat and of its probable cost to him.

So in our schooling and in our daily contacts with the sales organization we are continually stressing the necessity for painstakingly complete standardized presentations of the gas heating story linked with an honest, conservative estimate of the yearly cost to the customer.

If specialty selling may be defined as the business of selling an article for which there is no existing popular demand, our campaign is a campaign of specialty selling. It was, therefore, realized from the beginning that advertising would have to play a large and almost unprecedented part in educating the public of the Chicago region to the advantages of what we have to sell, and in the course of time creating from the ground up a demand for the conveniences and comforts of gas house heating. So it was decided to tell the Chicago people through every available medium about the advantages of gas for house heating.

Kettering, the famous automotive engineer, has frequently said that it is the obligation of the automobile industry to keep the American public dissatisfied with what it has. Similarly we conceived it as our job to create in the minds of Chicago people a new standard of values for house heating. We wanted to make them feel in their very bones the inadequacies and discomforts of existing heating systems. We wanted to make them feel that no home is modern unless it has in the basement a thoroughly automatic heating system burning a finished and not a raw fuel.

For this reason our newspaper advertising has been telling week after week about the conveniences and comforts of gas house heating and has been saying very little about the more specific details of our proposition. It is our belief that newspaper advertising must accomplish this large educational task if our sales force in its daily canvassing is to maintain the selling rate that we demand of them.

Our full-page and three-quarter page advertisements appear in the Chicago newspapers throughout the week and on Sunday. We also advertise in about 50 newspapers of the outlying territories and in many of the local foreign language papers.

As another means of making sure that all Chicago is thinking and talking about gas house heating, we use most

of the Chicago radio stations, linking brief messages with time and weather signals. Billboards are also used throughout the entire territory, our August showing including more than 700 24-sheet boards. Next week we begin to use car cards in the surface cars and elevated lines and posters on the station platforms.

In order to tie in the companies' stores with this advertising program, campaign headquarters supplies them with standard window trims to the number of fifty-two. Heating contractors in Chicago are also being supplied with standard window trims and inside displays.

The largest source of direct leads on new business in this, as in other similar sales drives, is the employee body of the three companies. All employees in all departments are urged to turn in the names of prospective house heating customers. They are given a small commission on any such leads that develop into sales within a reasonable time. We enclose "stuffers" with the gas bills in all three companies and find that we get many prospects through this channel to supplement the coupons received from our newspaper advertising.

In general comment on our advertising, it may be said that after ten weeks it has unquestionably influenced public opinion to a noticeable degree. House heating in general and gas heating in particular are being discussed across the bridge table and across the dinner table, on trains, in clubs, in fact wherever people gather.

In justice to our competitors I must concede that a definite part of the interest which has been aroused is due to competitors' advertising. Much of it is so acrimonious and unfair as to indicate a good deal of apprehension as to the growing public acceptance of gas for house heating.

Further evidence that previous apathy towards gas house heating has been quickened by advertising into lively interest in the subject is the very volume of sales which has been brought in so far by our sales organization. Some of our more expert salesmen occasionally make three and four sales a day. One man has sold 107. The average for the entire organization, in the 10 weeks since the beginning of the sale, is 34 per salesman. It is my feeling that such results are possible only in a community where people are in truth being educated to a new standard of house heating values.

A number of additional observations can be made at this time which might interest some of you. We find, for example, that in Chicago proper gas burners are displacing competitive fuels in the following ratios: Hard coal 3.5%, oil 12.3%, coke 29.4%, soft coal 49%.

These figures indicate that our sales effort is hitting pretty close to the center of the target. We are not, for the most part, displacing so-called luxury fuels. Our real competition is soft coal and coke.

Another indication that we are hitting our market rather accurately is the fact that the average annual estimate of customers' heating cost is almost exactly $150, indicating that our average buyer lives in a very ordinary sort of home of the 5- and 6-room variety. He is the same man who would spend about $95 a year for soft coal.

Still another indication that our buyer is Mr. Average Citizen is a map of Chicago on which we plot installations as they are made. The map demonstrates that gas heating is being sold everywhere throughout the residential sections of the city, as distinct from the apartment house sections.

It might be of interest, too, that about three-quarters of our sales are made in the presence of both husband and wife, and about two-thirds of them in the evening. We anticipated, before the campaign was begun, that many evening calls would be required, and accordingly specified in our help wanted ads that salesman must be prepared for evening work. Very few sales are closed before lunch time.

I might add here that in order to hold down our percentage of reverts we have our credit departments scrutinize every sale closely and in cases where the buyer does not own the house we insist on the owner signing a form of consent.

As to the effect of this gas house heating campaign on the gas industry in the Chicago area, it is still too early to generalize safely. But of one effect I think we may be fairly certain, and that is a perceptible increase in the "salesmindedness" of the three companies involved. This thought was expressed as follows a few days ago by an official of one of the companies who said:

"It was not so many years ago that the electrical industry dealt the gas industry what was then considered a knockout blow, taking from us our major business, which was the lighting business. But the gas industry put on its fighting clothes, went after the cooking market and we all know the result.

"Once again the gas industry has a fight on its hands. We no longer can feel complacent about our hold on the cooking market. The electric range is not now a serious threat in this market, but it could easily become so. It's no secret that Chicago's kitchen is likewise the scene of a battle between the advocates of electric and of gas refrigeration.

"But it is down in Chicago's basement that the issue is being chiefly fought out. The oil man is showing a lively interest in domestic water heating, the coal man joins hands with him in resenting our invasion of the space heating field.

"So, when I tell you that the gas industry everywhere, and notably here in Chicago, has a scrap on its hands I want to emphasize that our gas house heating salesmen and supervisors are our standard bearers and our shock troops, because just as surely as gas becomes generally accepted as the perfect and widely desired house heating fuel the fight will be won all along the line.

"The customer whose house is heated with gas to his great satisfaction will be a customer who will heat his water with gas, who will refrigerate his foods with gas and who will continue to cook his three meals a day on a gas range."

Oklahoma Utilities Association

THE Executive Committee of the Oklahoma Utilities Association has selected March 6 and 7, 1934, as the time and the Mayo Hotel, Tulsa, Oklahoma, as the place for the sixteenth annual convention of the association.

This convention embraces all branches of the public utility industry in Oklahoma and the attendance probably will reach about 500 members.

Pittsburgh Campaign Sells 14,127 Space Heaters In 24 Days

By George W. Ratcliffe

President, The Manufacturers Light & Heat Company, Pittsburgh, Pa.

METROPOLITAN Pittsburgh is in the heart of the soft coal area, consequently the heating load of the gas companies serving this community is subject to extremely intensive competition from low priced competitive fuels. The reduction in the cost of these fuels in the past few years made it imperative that a more intensive effort be put forth to prevent serious inroads being made on this heating load.

Approximately 70 per cent of this load is derived from small space heaters, and since the small space heater load is mostly off peak, it was felt that this was an extremely valuable portion of the sales.

During the past four years of economic stress, the sale of space heaters in this territory had declined to a point where the new sales were not keeping pace with normal obsolescence. Adding this to the intensive competition it was felt that a decline in this load would be inevitable unless some immediate action were taken.

To this end a sales committee was appointed from the gas companies serving this area to recommend a detailed plan of action.

After due consideration and investigation this committee recommended an All-Employee Space Heater Sale; all of the gas companies serving this area to join forces, and have all employees of all departments of the utilities take an active part in the sale of radiant heaters.

It was decided to start the activity on Monday morning, September 18, and continue it twenty-four working days, or until the close of business on Saturday, October 14. This period was determined upon as being the peak period of normal space heater sales, a check of the Weather Bureau records showing that the first chilly weather of the season would come in this period, and that the first frost normally came either the last week of September or the first week of October. A four weeks' period was decided upon inasmuch as it was felt that radiant heater sales could not be maintained in large volume over a much longer period, nor would it be possible to maintain active interest among the entire personnel for more than a four weeks' period. This personnel is scattered over an area of several hundred miles and not available for daily "pep" meetings.

Descriptive booklets distributed to prospective customers in Pittsburgh's Space Heater Campaign

Heater Selected

For a campaign of this nature it is necessary to have a leader of well-known value, and for this purpose there was selected a heater of nationally known manufacture which could be sold at a price of $9.85 cash or, if the customer desired, on terms of $1 down and $1.17 per month for eight months, this plan enabling the company to secure practically all of the money for the heater during the current heating season.

Credit Rating

All heaters sold on terms were, of course, subject to the customary credit inspection; however, the sales were made among employees' friends, and it was found that these people, being

friends and acquaintances of the employees, were on about the same credit level as the company personnel, and as a whole very few sales were refused on account of credit. A great number of cash sales were made, the employees turning in the full amount of cash with the order.

Contract Form

It was obviously impossible to teach a large personnel to properly fill out a complicated contract form in a short period of time. Feeling that the contacts would mostly be very good and appreciating the small amount involved in each sale, we provided the employees with a separate lease form. This was a very simple form of contract with little filling in necessary.

Bonus to Employees

This activity came at a period when most employees were quite busy. All gas men are familiar with the rush of business that always comes with the first chilly weather. This meant that our employees would be putting in full time at their regular duties and that, consequently, if they were to devote any time to this activity, it would have to be their own evenings, and in order to make the activity a success, it would be necessary for each employee to devote considerable time to it. In order to secure this extra effort on the part of each employee we offered a bonus of $1 for each heater sold, this bonus to be paid to the employee closing the sale.

Educational Meetings

In order to educate and enthuse the employees, evening meetings of all employees were held before the activity started. At these meetings a sample of the heater selected for sale was shown. A speaker described the heater, gave the sales points in favor of this particular heater, and attempted to sell the employee on the value of this heater to a prospective purchaser; also to enthuse the employee over the load-building possibilities for his company. The employee was impressed with the fact that he could offer his friends a genuine value. This is absolutely necessary to the success of such a campaign. An employee will not solicit business from a friend unless he is honestly satisfied of this outstanding value.

Each employee was also presented with a sales kit. This sales kit consisted of a large envelope which the employees could carry throughout the campaign. In this envelope were placed sales instructions, price sheets, pictures and literature regarding the heater; also two order blanks. The employee was advised that his local manager would have an additional supply of order blanks as needed.

Put Summer Sun Into Winter Homes
WITH RADIANT GAS-HEAT
Nothing adds so much genuine cheer to enjoyable home life in winter days and evenings as the comfortable warmth of the Radiant Gas Heater.
OUR FALL RADIANT HEATER CAMPAIGN
September 18 to October 14
$9.85 Cash $10.36 on Terms
$1.00 Down with the Order and Eight (8) Equal Monthly Payments
THE QUOTA
ONE RADIANT HEATER SALE FROM EACH EMPLOYEE
Easy to sell on these Special Prices and Terms:
A Genuine Humphrey Radiant Fire Heater; Full Size; 10 Mantles; Beautiful Oxidized Brass Finish; Handsomely Designed.
SEE YOUR DISTRICT MANAGER, AGENT OR FOREMAN FOR FULL DETAILS
TIME IS MONEY
DON'T DELAY — START TODAY

Reproduction of "Broadside" which was delivered by Pittsburgh meter readers to one-half of prospective customers in drive for sales of radiant heaters

Advertising

It was decided to support this campaign with one newspaper advertisement each week of the campaign. In addition, the meter readers delivered a broadside to approximately one-half of all customers, these customers being in more or less selected districts where previous surveys showed a very low saturation of space heaters or a high percentage of obsolete heaters that should be replaced.

Starting about two weeks before the activity opened, an advertisement was printed on the gas bill, giving details of the activity. This meant that these

Typical Value
RADIANT HEATER
Sale
For a
SHORT TIME ONLY...
$9.85 cash
OR $1 FIRST PAYMENT AND $1.17 A MONTH FOR 8 MONTHS ON YOUR GAS BILL.
NRA
WE DO OUR PART
NATIONALLY ADVERTISED 10 RADIANTS FULL SIZE
NEVER BEFORE SOLD FOR LESS THAN $16.40 installed
Don't miss this Special Bargain
Big Special Radiant Heater Sale, now on! See your dealer or Gas Company! Here's a typical value: Rich Oxidized Brass finish. 21" high; 24¼" wide; 7" deep. For fireplace openings 22" to 36" wide . . . and provided with 4" vent for rooms having no fireplace. Will save its cost quickly by letting you start your big fire later and stop it sooner, in fall and spring. Price includes installation, where gas lines are immediately available. At this special short-time price, the biggest little investment you can make in home comfort! Other models and sizes at low prices and easy terms. Buy yours today!
SEE YOUR DEALER OR GAS COMPANY
The Equitable Gas Co.
The Peoples Natural Gas Co.
The Manufacturers Light & Heat Co.
The T. W. Phillips Gas & Oil Co.
THIS ADVERTISEMENT SPONSORED BY
IN THE INTEREST OF GAS APPLIANCE DEALERS

Type of newspaper advertising inserted over names of companies which sponsored Pittsburgh's successful drive to increase space heating load

bills would be distributed so as to give complete coverage of all customers by about the middle of the campaign.

Two radio stations were used, daily announcements in regard to the heater being made in connection with Weather Bureau reports.

Heaters were ordered and delivered to each display floor and to all offices the week before the activity started. Displays and window trims were set up in an attractive manner in preparation for the opening day of the activity. Considerable effort was made towards getting the sale off to a good start by having a successful opening day and, as a result, total sales of 648 Radiant Heaters were secured for the first day of the campaign. This represented total sales for the three companies involved. Suitable bulletins were sent out at least once each week showing individual and district results. These bulletins helped to maintain a high interest throughout the activity.

14,127 Heaters Sold in 24 Days

The final results of this campaign were far beyond original expectations. Some employees reported individual sales as high as eighty-one heaters, and individual employees reporting sales of thirty-five to forty-five heaters for the twenty-four working days were quite a common occurrence. The interest was quite general. In one group of 124 employees there were 119 who reported the sale of one or more heaters. These are employees outside of the sales department. The regular sales force devoted its entire time to a sale of central-fired house heating.

The final results for the twenty-four working days showed that employees of the three gas companies serving the Pittsburgh area had sold a total of 14,127 radiant heaters. This compares with average annual sales during the past four years of about 2,400 heaters.

The activity was such a success and so much enthusiasm was created, that many employees asked that it be continued for another month. It was felt, however, that it was not wise to attempt any extension beyond the period originally planned, and the campaign was terminated as of October 14. Many employees have already requested that the campaign be repeated next year, feeling that with the knowledge and experience gained this year they would be able to make a much better showing in another season.

Gas Men Enroll in Columbia Home Study Course

THE first men to enroll in the Home Study Course on American Gas Practice at Columbia University, New York, which is based on a revised edition of the textbook, are John H. Taussig, Philadelphia Gas Works Company, Philadelphia, Pa., and Fred H. Reblitz, The Peoples Gas Light and Coke Company, Chicago, Ill.

The total number of enrollments in the course on Manufactured Gas, based on the first edition of the textbook, was 1,643, of which approximately 650 completed the course and about 90 are still working on it.

Welding Conference

PURDUE University announces that its ninth annual Conference on Welding to be held at Lafayette, Indiana, December 7-8. This conference will be under the direction of the Engineering Extension Department and the Department of Practical Mechanics, with the manufacturers of welding equipment cooperating.

The conference will include talks, exhibits and demonstrations, and is open to all manufacturers and welding shop operators of Indiana and neighboring States.

Address inquiries to Engineering Extension Department, Purdue University, Lafayette, Indiana.

Gas Makes Fewer Chimneys For Them To Sweep

CHIMNEY sweeps in England are apparently determined to see that their sons keep in the "fire" business despite the rapid disappearance of sooty flues before the advance of gas.

At a recent meeting of the British Commercial Gas Association at Bournemouth the sweeps sent a letter and a deputation asking the Gas Association to give special consideration to their sons, when distributing jobs. It was pointed out that the sweep's job was generally handed down from father to son, but that the increased use of gas fires had put many sweeps and their sons out of work. If it continued, it was said, there would be nothing for the sons to do.

It is expected to be a long time before the profession of chimney sweep disappears altogether, but the extent of the contraction is illustrated by the case of one sweep in London, who now sweeps four chimneys in a hotel where he used to sweep 210.

Sweeps Are Pessimistic

From any eminence affording a vista of its family roofs England's metropolis continues to furnish the ever-amazing spectacle of its forest of chimney pots—"chimbley" pots in the cockney vernacular. But, as gas displaces coal for heating and cooking, their utility is fast going as outlets for that grimy smoke which imparts its drabness to dwellings and monuments and whose all-pervading smell, so dear to the old Londoner returning from exile, is of the city's essence.

Chimney sweeps and chimney sweeping firms were pessimistic when consulted by a reporter for the *Morning Post* on the future of the art.

"It's one of the seven trades of man, on which all the others have been built," a sweep—and proud of it—declared. "But another fifty years, or less, and a sweep will be a curiosity."

"It's only city chophouses, and such-like places, where they want an open fire for grills, that keep us going at all," said the son of a family in East-cheap that has been sweeping the city's chimneys for 150 years. "I expect they'll be changing to gas, too, and more big buildings will be put in, using central heating instead of fifty or eighty chimneys, and then we'll have to move for good and all."

Women, Too, Are Sweeps

The fact that in recording the passing of its industry the newspapers failed to mention the fact that women from time immemorable have engaged in the business of sweeping chimneys has brought to them many reminders from readers.

"The unjust inference that this profession is a prerogative of the male sex should not pass unrefuted," writes one correspondent to *The London Times*. "We have in the British Museum the charmingly designed trade card of Jeane Tempell, who followed this calling 'at the signe of the Woman Chimbley Sweper in Nutmers Street, near the Watch House in Holborn.'

"This card is a woodcut of the early part of the eighteenth century and presents Jeane, picturesquely but somewhat unpractically attired, standing with folded hands and her back carelessly turned to a chimney afire in a row of houses behind her. Her attention is being drawn to this outbreak by a small boy who evidently has a keener eye to business, for he carries some brooms under his arm. Another boy, broom in hand, gesticulates to her from the top of a neighboring chimney.

"Judging from her immaculate costume and from the presence of the two boys, we may take it that Jeane was a mistress craftswoman who deputed the dirty work to her assistants. Nevertheless, we must accept her own statement that she was a 'Woman Chimbley Sweper,' and those who aver that they have 'yet to hear of women sweeps' will please pay attention to Jeane Tempell."

Another writes:

"May I put on record that a woman sweep bravely carries on business in the north of London (Clapton) for and on behalf of an invalid husband? She is an interesting personality as she trundles along the high road a barrow containing her trade implements, and withal she is an energetic and useful member of the local Conservative Association."

Natural Gas Expanding in Indiana

THE Indiana Eastern Gas Corp. has drilled another 9,000,000 cu.ft. well in the Francisco field, east of Princeton, Ind. The Knox Engineering Corp., now a subsidiary of the Indiana Eastern Gas Corp., brought in the well, which by actual guage was nine and a quarter million feet.

M. J. Dewey, president of the corporation, said that plans are being completed whereby another line is to be constructed out of Southern Indiana, to points in the northern part of the State. It is announced also that the company has acquired control of the Triangle Oil & Gas Co., properties and production, near Washington, Ind.

Cosmopolitian Gas Men

Headquarters was honored again by a call from another distinguished visitor from overseas—this time from far-off China. H. E. Stone, general manager of the Hong Kong and China Gas Company, Limited, stopped in on his way to the headquarters of his organization in London.

Overland from the Pacific Coast where he landed, Mr. Stone has been inspecting American gas production, distribution and utilization procedure with a view to adopting such practices as may be found useful.

It was interesting to hear that the gas man's problems seem to be somewhat alike the world over, even if they are aggravated by the delightful custom of Chinese servants who never extinguish a gas flame once it is lighted.

Executive Board in Session at Chicago

Before retiring as president of the American Gas Association, Arthur Hewitt presided over the meeting of the Executive Board, September 25, at Chicago, Ill., as shown in the above picture. From left to right, *those shown are W. J. Welsh, W. Frank Roberts, E. L. Wilder, Samuel Insull, Jr., J. M. Roberts, J. S. DeHart, Jr., J. A. Perry, B. J. Mullaney, F. A. Lemke, R. W. Gallagher, Alexander Forward, Kurwin R. Boyes, Arthur Hewitt, Herman Russell, J. C. Barnes, Conrad N. Lauer, Walter C. Beckjord, C. E. Paige, D. B. Stokes and Carl D. Jackson*

Taxation of Non-Resident Business in Canada Modified

SECTION 27 of the Canadian Income War Tax providing for the assessment of income tax charges against any non-resident person soliciting orders or offering merchandise for sale in Canada through an agent or employee has been rendered inoperative for the present by the Inspector of Special Non-Resident Income Tax Laws, according to a report to the Department of Commerce from Assistant Commercial Attache O. B. North, Ottawa.

While no official announcement has been made concerning the several provisions of the Income Tax Law affecting the liability of non-residents carrying on business in Canada, it is understood in trade circles that non-residents transacting sales of merchandise in the Provinces through a resident agent or travelling representative but who do not maintain offices or carry consignment stocks locally will be exempt from the payment of income tax on revenues derived from such sales.

Section 27 of The Income War Tax Act, Chapter 97, R. S. C., 1927, provides in part as follows: "Any non-resident person soliciting orders or offering anything for sale in Canada through an agent or employee, and whether any contract or transaction which may result therefrom is completed within Canada or without Canada, or partly within or partly without Canada . . . shall be deemed to be carrying on business in Canada and to earn a proportionate part of the income derived therefrom in Canada."

While the section has been a part of statutory law since 1917 and maintained in the revised statutes of Canada, 1927, it is not known that any effort has been made to enforce the section fully until within recent years.

As a result of the many inquiries following recent circularization of American exporters by the Canadian government requesting the execution and return of an income tax form, the Inspector of Special Non-Resident Income Tax Laws has just issued a notice advising that certain legal features of section 27 are at present under consideration and that the filing of the form previously mailed may be dispensed with until further advised.

Voters Reject City Ownership Plans

VOTERS in Birmingham, Ala.; Youngstown and Cincinnati, O.; San Francisco, Calif., and Salt Lake City, Utah, last month rejected proposals for municipal operation of utility plants. Elections in Camden, N. J., and Akron, Ohio, resulted differently. Gas service was involved only in Cincinnati.

One of the factors which has brought municipal ownership to the forefront has been the possibility of borrowing funds from the Public Works Administration to build plants.

What the "Chicago Tribune" calls the "black eye" that the November elections have given to the municipal ownership idea offers a measure of reassurance to utility investors that the majority of the voting public is opposed to public ownership; these voters do not need to be convinced that government ownership and operation of utilities is a hazardous venture for the taxpayers and wasteful to a high degree with any duplication of facilities for public service.

Addison B. Day Elected Member of A. G. A. Board

ADDISON B. DAY, president and general manager of the Los Angeles Gas & Electric Corp., Los Angeles, Calif., was elected a director of the American Gas Association at a meeting of the board, in New York, November 15. The vacancy filled by Mr. Day was caused by the elevation of H. O. Caster, of New York, to the presidency of the Association.

Addison B. Day

For years Mr. Day has been active in Association affairs. In 1920, he served as president of the Pacific Coast Gas Association.

A native of Chicago, Ill., Mr. Day has spent most of his life in Los Angeles, where he received his education and entered upon a business career in 1895 in the service of the Los Angeles Lighting Company, a predecessor of the present corporation. His whole business life has been with this utility in its various corporate stages.

In the order named, he has filled the following positions: Salesman, bookkeeper, chief clerk, manager of appliance department, auditor, assistant secretary, manager of operation, general superintendent, vice-president and general manager, executive vice-president and general manager, and, since 1928, president and general manager.

William B. Nichols Honored by Associates in Boston

W. B. Nichols

A DINNER in honor of William B. Nichols, vice-president of the Boston Consolidated Gas Company, Boston, Mass., was tendered him October 27 by thirty-nine associates in the company on the eve of his retirement after forty years of service. He retired on November 1.

With D. D. Barnum, president of the company, serving as toastmaster, warm tributes to the character and accomplishments of Mr. Nichols were expressed by William E. McKay, president of New England Fuel & Transportation Company; T. W. Kennedy, president of the Mystic Iron Company; E. H. Bird, vice-president of Massachusetts Gas Companies; W. C. Beckjord, vice-president and general manager of the Boston Consolidated Gas Company, and F. D. Cadwallader, vice-president in charge of sales.

On behalf of those present a silver cocktail set was presented to Mr. Nichols by Mr. Beckjord, together with a framed painting symbolizing a toast and bearing the inscription "To William B. Nichols. . . . . This expression of our perpetual toast to his fine comradeship, warm friendliness and great service during many years of lasting accomplishment." The painting was signed with forty names.

A bouquet of roses was presented to Mrs. Nichols, from the group, by Mr. Cadwallader.

Mr. Nichols entered the gas industry in 1893 as a clerk with the Brookline Gas Light Company. He later served as assistant to John Gould, engineer in charge of distribution of the Boston Gas Light Company. From 1906 until 1923 he was with the Citizens Gas Light Company of Quincy, leaving the presidency of that company in 1923 to act as vice-president of the Commercial Department of the Boston Consolidated Gas Company.

Holds A. G. A. Fellowship at W. Va. University

Leonard C. Swing

LEONARD C. SWING, holder of the Natural Gas Department Fellowship of the American Gas Association at West Virginia University, was born at Millpoint, West Virginia, June 9, 1910, and his home is in Rainelle, West Virginia. He received his B.S. Ch.E. Degree at West Virginia University in June, 1931, and is at present a candidate for the doctor's degree.

During his freshman year, Mr. Swing was awarded the Tau Beta Pi cup for maintaining the highest scholastic average among engineering freshmen. Subsequently, he was elected to and held office in Tau Beta Pi, honorary engineering fraternity, Phi Lambda Upsilon, honorary chemical fraternity, and Sigma Gamma Epsilon, honorary geological, ceramic and metallurgical fraternity. A member of "Scabbard and Blade," honorary military organization for advanced men, Mr. Swing holds a commission of second lieutenant in the Chemical Warfare Reserve and is the ranking reserve officer on the campus.

Mr. Swing was employed as a member of the geo-physical prospecting corps of the Lycoming Producing Corporation at Wellsboro, Pennsylvania, during the summer of 1932.

Approval of Gas Cocks Under the Code

UNDER the terms of the Code of Fair Competition for the Gas Cock Industry, as approved by President Roosevelt on October 31, 1933, gas cocks cannot be sold as approved A. G. A. apparatus unless they conform to standard specifications prepared by the Association of Gas Cock Manufacturers in cooperation with the Testing Laboratory of the A. G. A.

The paragraph from the code which makes this interpretation clear reads as follows:

"ARTICLE VI, Section 1. The Association (Association of Gas Cock Manufacturers), in cooperation with the testing laboratories of the American Gas Association, may prepare standard specifications for the respective types, sizes and weights of gas cocks. When such standard specifications have been prepared and published to the Industry, no producer shall knowingly sell any gas cock as an A. G. A. approved gas cock unless such gas cock conforms with such standard specifications."

Mr. Gallagher Elected Standard Oil Director

R. W. Gallagher

RALPH W. GALLAGHER, president of the East Ohio Gas Company, Cleveland, Ohio, and former president of the American Gas Association, was elected a director of the Standard Oil Company of New Jersey, November 17. In this new position Mr. Gallagher will make his headquarters in New York and will take charge of the natural gas interests of the New Jersey company.

NATURAL GAS DEPARTMENT

FRANK L. CHASE, Chairman A. E. HIGGINS, Secretary JOHN B. TONKIN, Vice-Chairman

Safety Precautions During Repair of High Pressure Gas Mains

By Fred F. Doyle

Manager, Natural Gas Division
Pacific Gas and Electric Company

THIS article will deal with the safety precautions taken while repairing natural gas transmission mains under pressures varying from 475 lbs. per square inch to 150 lbs. per square inch as operated by the Natural Gas Division of the Pacific Gas and Electric Company.

The pipe lines in that system are of 16", 20", 22", 24" and 26" in diameter of steel pipe, with wall thicknesses ranging from ¼" to ⅜". They are all welded lines, being constructed by both the oxy-acetylene and electric arc methods. They traverse desert and rugged mountainous country, and also cross cultivated lands.

A plug-type valve is located every five miles in the desert country and as close as two-mile intervals in the mountainous or cultivated sections where the line is not so accessible. A private telephone line follows the gas line, connecting the gas dispatching office in San Francisco with the field dispatching office at Kettleman Hills, the main supply source. A telephone tap is located at each valve to which portable telephones are attached during times of repair work, so as to enable the men on the line to communicate with the field, the dispatcher's office, and also with each other on the line. Telephones can be set up at the location of the trouble on the pipe line. The establishment of communication is one of the most valuable conveniences during times of emergency and is absolutely essential, so that progress of the repair work can be reported and the reducing or increasing of the pressure from the field can be controlled.

Practically all of the repair jobs necessary are caused by breaks in the joints varying from five or six inches to as much as halfway around the circumference of the pipe. Such breaks are caused by contraction of the line in extremely cold weather or by settling or moving of the ground around the pipe; the latter causes the greatest number of breaks.

The loss of gas through such cracks under high pressure varies from two to eight or ten million cubic feet per day, so an undue drop in pressure is noted and also is shown by a check of the amount of gas received into and delivered from the line. Such breaks, of course, are readily found by the patrolman and, under certain weather conditions, can be heard several miles away. They also cause dirt and small rocks to be thrown out of the ground for distances of from forty to fifty feet from the line, so that great precaution must be taken in approaching the escaping gas and shower of dirt and rocks. One of our most explicit safety instructions is that repairmen must not drive an automobile up to a leak or into the path of the escaping gas, since it could easily become ignited from the machine. One life was lost by just such an accident in California a few years ago.

Leaks can be divided into two classes: large ones where the opening in the pipe is so great that the line must be shut off, and smaller ones (cracks 6 to 8" long) which are repaired without taking the line out of service. How the job is to be handled is left up to the judgment of the foreman in charge, who is an experienced man; in either case certain precautions are taken and rules laid down which must be adhered to.

Before starting work on the line the men must divest themselves of all matches of any kind so that no accidental fires will result; this automatically prevents smoking during the progress of the work. No open lanterns of any kind are used; only approved electric safety lamps are allowed. Flood lights from automotive equipment and electric arc welding machines are used extensively at times when repair work has to be done at night.

Where there is danger from flying particles causing eye injuries, the men are required to wear goggles. Goggles must, of course, be worn at all times by welders and also when the electric arc welder is being used other men must wear proper goggles to prevent eye injuries or strains which might be caused by the rays from the arc.

Where the lines traverses ground covered with dried grass or underbrush the ground is cleaned off around the work sufficiently to prevent a small fire starting which could possibly result in a serious conflagration. Suitable fire prevention apparatus is kept readily available on such jobs, such as fire extinguishers, water sacks for wetting and beating out fires, shovels, and axes.

"Sparkless tools," such as shovels, picks, bars and hammers are provided the crews to be used on work being done in the presence of gas, further minimizing the possibility of accidental ignition. All tools must be kept in first-class condition at all times to be of utmost use when needed and also to be safe to use.

All excavations made must be of sufficient size so that men have plenty of room to work safely and fixed so that they can be quickly vacated if necessary. Ample shoring must be used to insure against caveins in cases where the character of the ground or depth of the excavation requires it.

Since all of the high pressure gas lines run through open country and are not laid at great depths the use of a gas mask during repair work is left to the discretion of the foreman in charge; they are very seldom required. However, when working in a place that requires the use of a gas mask, a rope must be attached to the body of the workman in the excavation and an attendant stationed above, so that the work can be drawn to the surface in case of necessity.

Warning signs, barriers, and red lights at night must be installed wherever temporary hazard exists and where conditions require, men are stationed each side of the leak to warn, or halt if necessary, the passing motorist or pedestrian. Live gas mains are never cut or disconnected until an effective electric jumper has been installed across the part to be cut or disconnected.

When a large leak is discovered the nearest pipe line repair crew is telephoned and they proceed immediately to the job with all of their equipment, including both electric arc and oxy-acetylene welding apparatus. Before starting any repair work the gas dispatchers are called and arrangements made to shut in the two or five mile section of line in which the break is located. When clearance is given the main line valves are closed and six inch bleeder valves at each end of the section are opened wide, bleeding the gas to the atmosphere. These valves are opened by pulling the wrench handle by means of a rope so that the men will be a safe distance away; the men also stuff their ears with cotton to protect the ear drums from the roar of the escaping gas. When the pressure has been reduced sufficiently excavation around the leak with sparkless tools is started and continued

This is the fourth and last of a series of articles prepared under the auspices of the Accident Prevention Committee of the American Gas Association in a cooperative effort with the National Safety Council to develop greater publicity on the safety practices in the natural gas industry.

until a sufficient sized excavation is made, by which time the gas pressure is reduced to zero or a few ounces above. The welder is equipped with a complete asbestos outfit including helmet and mask, suit and gloves, but before entering the excavation a lighted torch is lowered into it so that any escaping gas is ignited. Sometimes it does not ignite but flashes back in the pipe for an instant. If the section of the line is on a steep mountain side the gas in the line will flow to the upper open blow-off valve and draw in air at the lower valve; a strong wind blowing along the line will also cause a circulation through the pipe. To prevent such a condition causing an explosive mixture to be formed in the pipe a man is stationed at one blow-off valve with a telephone so that the foreman at the break can telephone him the necessary instructions to control the blow-off and main line valve. In this way the section of line being repaired is kept under a slight gas pressure so that while welding is being done a small flame, one to two feet long, burns at the break so that it is known at all times that an explosive mixture does not exist in the pipe. It will be noted that many precautions are made to prevent accidental fires, yet the repair work is carried on with a controlled fire burning.

After the break is completely welded the pipe is heated to a very dull red all around the circumference which anneals the pipe. Before adopting this practice many repaired welds broke out again.

After annealing and cooling, the blow-off valves are closed; the main line valves opened and the dispatchers notified that the work is completed. Following that, further precaution is taken to avoid a second break at the same joint by welding a "butt-strap" around and to the outside of the pipe. This is merely a steel band about six inches wide and one-quarter inch thick, which is welded to the pipe at its edges by means of the electric arc. Since the voltage controls the depth of penetration of the arc in the pipe this can be done after the line has been put back in service.

For small breaks, previously mentioned, repair work is done without taking the line out of service by use of a patented clamp designed by our own men. A steel plate about six or eight inches wide and several inches longer than the break is placed over the break and held to the pipe by a clamp. A gasket keeps gas from blowing around the edges and a 2" bleeder valve allows gas to escape from beneath the plate. The escaping gas is piped away from the bleeder valve and the plate is "arc-welded" to the pipe line. When the welding is completed the bleeder valve is closed and plugged, the clamp removed, completing the repair job.

In all cases of course excavations are completely filled before leaving the job so that no vehicles, cattle or sheep can get into them.

On the Pacific Gas and Electric System all of the men are given first aid courses and the idea of doing a job safely is constantly kept before them. First aid kits are provided on each automobile and truck, the men being required to treat all minor injuries such as small cuts, scratches or burns; no matter how slight they must be reported. The high pressure transmission system has been in operation over four years and although some forty odd breaks or emergency repair jobs have been taken care of, many of which were under difficult conditions, not one lost time accident has occurred on the pipe lines since the beginning of operations. The efforts put forth in the interest of safety have been justified and very gratifying.

Thousands View Exhibits of Philadelphia Gas Works

Philadelphia Gas Works Company's Display at Electric and Radio Show

DISPLAYS of gas appliances in backgrounds which dramatized the all-round utility and economy of modern gas service were conspicuous features of the annual Electric and Radio Show and the "World's Greatest Food Fair" recently held in Philadelphia's Commercial Museum.

The five-day exposition of electrical progress, with accompanying display of gas equipment which was formally opened on October 2 by Mayor J. Hampton Moore, attracted about 100,000 persons.

Opening only a few hours after the curtains were rung down on the Electric Show, the Food Fair enjoyed one of the most successful runs of its long history. Approximately 525,000 persons were said to have passed through the turnstiles in the two weeks it was open.

Booths occupied by The Philadelphia Gas Works Company at both expositions were large and prominently located. The accompanying photographs indicate the skillful arrangement of equipment and the impressive modern design employed in constructing the displays.

In the Electric Show exhibit, a striking effect was obtained by contrasting the gleaming white ranges and Electrolux refrigerators against a background of black monotile, and a black and white linoleum floor. Concealed lighting helped to emphasize the beauty and smartness of the appliances. Automatic water heaters, a gas ironer and house heating boiler were also included in the display.

The center of attraction in the gas company's exhibit at the Food Fair was a style show of modern gas ranges. Flanking this display were exhibits of a model kitchen and a modernized basement with appropriate gas equipment.

On either side of the utility's exhibit were special displays of several prominent manufacturers and distributors of gas appliances, including The American Stove Company, Standard Gas Equipment Company and Bartlett and Company, Philadelphia distributors of Ruud water heaters.

In conjunction with the Food Fair, the Show management conducted cooperatively with The Philadelphia Gas Works Company, a series of afternoon cooking classes and demonstrations. The demonstrations were given in a model gas kitchen which was installed on the lecture platform. Miss Beatrice Cole Wagner, Home Service director of the Gas company, addressed the large classes.

The unusual interest created by the new-style gas ranges and air-cooled Electrolux refrigerators kept salesmen assigned to the displays constantly on the alert. Posters flaunting the story about the new low gas rate for house-heating also brought scores of inquiries on this subject.

Many excellent leads were developed by the company's salesmen during both shows and a considerable number of sales of all types of appliances were closed.

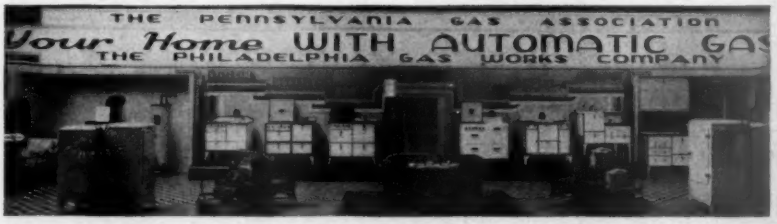


Exhibit at "Food Fair"

TESTING LABORATORY

R. M. CONNER, Director Managing Committee: J. S. DeHART, Jr., Chairman N. T. SELLMAN, Secretary

Protective Relief and Gas Shut-Off Devices for Domestic Water Heater Tanks

By Harry W. Smith, Jr.

Engineer, A. G. A. Testing Laboratory

SINCE gas is generally accepted as the most ideal form of energy for water heating purposes, it is perhaps only logical that the gas industry should lead in the development of safety devices and controls for hot water storage vessels.

Certain hazards which may develop through accident or carelessness and are due to the overheating of water confined in a closed vessel, are, of course, independent of the type of fuel or energy used and may be present whether coal, oil, gas, or electricity is used as the medium for supplying heat. Manufacturers in the gas industry, however, recognizing the possible hazards involved in excessive tank water pressures and temperatures, have for several years been active in the development of various safety devices for hot water storage systems. Among these are pressure, temperature, and vacuum relief and gas shut-off valves, which guard against the accumulation, in water heating tanks or boilers, of water at dangerous pressures and temperatures.

It should perhaps be mentioned here that in the case of gas water heaters installed on open systems,* the pressure on the storage tank is limited to that existing in the main at any particular time. Consequently, the question of providing for relief of excessive pressure by the use of pressure relief valves does not arise in this instance. Obviously it is necessary at all times to make a thorough examination of all existing conditions before installing a water heating unit of any description. In the case of automatic gas water heaters particularly, it is customary to exercise great care to see that all such details are carefully observed as well as those of the actual installation in order to insure their safe and satisfactory operation. In addition to this, modern automatic storage gas water heaters are equipped with thermostats which act to maintain the water in the storage vessel at a predetermined temperature by automatically controlling the gas supply to the appliance. It will be seen, therefore, that thermostatically controlled gas water heaters installed on open systems prevent the possibility of excessive pressures or temperatures being built up in the storage tank. The relief devices and shut-off valves discussed herein are simply additional means provided to guard against the possibility of excessive tank water temperatures or pressures however remote.

Nearly all water heater boilers now in use are mildly subject to corrosion and may in the course of time become weakened thereby. The nature and extent of such corrosion depends, of course, on a number of factors such as the kind of tank material and protective coating used, the character of the water supply, and the temperature of the stored water. Under such circumstances, where tank structures are weakened by corrosion, if excessive water pressures are permitted to build up within the tank as a result of neglect, accident, faulty installation, or the blocking of lines which could serve as relief outlets, rupture of the tank may occur and sizable quantities of water, at the pressure and temperature then existing in the system, released almost instantaneously. If the water pressure alone at the time of rupture is high, violent explosions do not occur, but dangers of flooding and scalding are imminent. If the water temperature at that time, however, is considerably above the boiling point of water at atmospheric pressure, violent explosions, caused by the flashing of hot water into steam, may occur and serious damage may result. Although such incidents are not frequent, pressure, temperature and vacuum relief valves, combinations thereof, and temperature actuated gas shut-offs are designed to forestall their occurrence. It is logical, therefore, that the use of these safety accessories is rapidly increasing in line with the modern trend toward preventing the development of hazardous conditions, however unlikely they may be.

In view of these facts, and since it was believed that no widely applicable or significant code concerning temperature, pressure and vacuum relief valves and gas shut-offs for use on domestic water heaters could be devised until more specific information concerning the construction, operating char-

* Systems which contain no check valve or its equivalent on the cold water inlet line. Any excess pressure which would tend to be built up from within can accordingly relieve itself to the main.

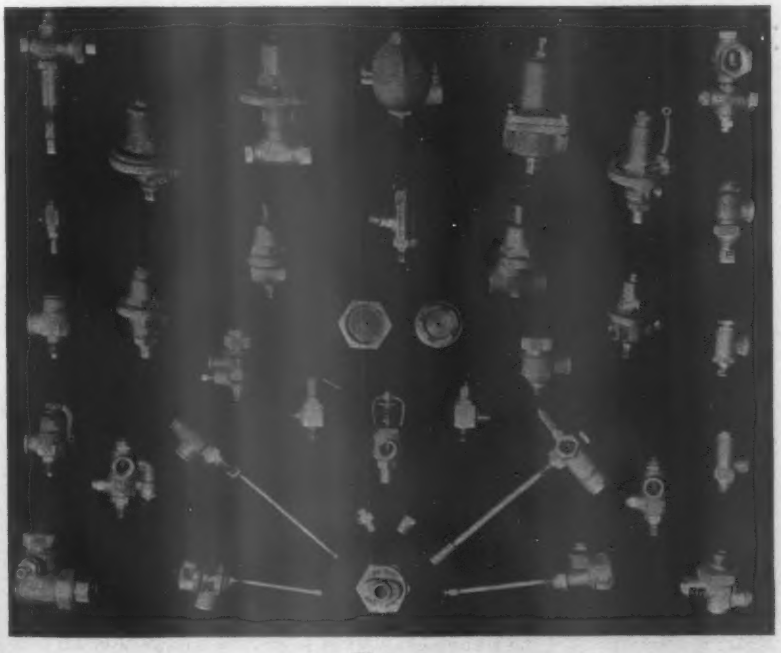


Figure 1

Representative types of pressure, temperature and vacuum relief and automatic gas shut-off devices tested by the A. G. A. Laboratory in its investigation

acteristics, and value of such attachments was made available, the American Gas Association Subcommittee on Listing Requirements for Gas, Pressure, and Temperature Control Accessories authorized the A. G. A. Testing Laboratory to make a thorough investigation of all commercial types of relief and shut-off valves. This research has now been completed and tentative requirements for such devices drafted and submitted to the appropriate committees for review and approval.

Some 74 different hot water relief or gas shut-off units were tested during the Laboratory's investigation. This group included 35 pressure relief, 26 temperature relief, 9 vacuum relief, and 4 gas shut-off elements. In many cases, of course, pressure and temperature relief, or pressure, temperature, and vacuum relief features were included in one integrally constructed device. So far as is known, every present-day type of water heater protective unit was represented in this diversified list. It is the purpose of this paper to discuss briefly the general operating characteristics, reliability, and limitations of various types of relief and shut-off valves, and to explain the basis on which future A. G. A. Listing Requirements will be drafted.

The pressure relief valve, the simplest and probably the most frequently used safety attachment for domestic water heating systems, acts to guard against explosion by preventing the development in storage vessels of the high hydrostatic pressures which ordinarily cause rupture. Although the pressure relief valve in itself does not forestall the accumulation in tanks of potential explosive energy (the result of excessive overheating of large quantities of water), it does, by minimizing the likelihood of tank failure, serve as a safeguard against the release of this energy. Valves of this nature are installed either on water heater storage tanks or in water lines leading directly into or away from them. In all cases, two opposing forces act upon the valve disc; the force of a spring or weight tending to keep the valve tightly seated, and the pressure of the water in the system tending to open the valve and permit water to rush out through the relief outlet or drain. The position of the valve at any time is, of course, regulated by the relative magnitude of these two forces.

Early in the Laboratory's investigation it was revealed that pressure relief valves are chiefly valuable only for the prevention of dangerous tank pressures built up by the expansion of water upon heating in closed systems.§ In an open system the pressure in the tank can never exceed the pressure in the water main to which it communicates, and, inasmuch as relief valves obviously cannot be permitted to relieve at, or below, distribution pressures, they are of small value in such instances. Furthermore, in any system, possible tank failure pressures not created by a thermal expansion of confined water must arise from line pressure surges, and none of the 35 tested pressure relief elements had sufficient capacity for water discharge, even in fully opened positions, to cope with such situations. The use of pressure relief valves on closed systems, however, is highly important, for if water is completely confined, enormous pressures, easily enough to burst any domestic tank, may be developed by heating the water for a short period of time. A pressure relief valve must, therefore, at some safe relieving pressure, discharge sufficient water to take care of the increase in water volume due to heating. Furthermore, a pressure relief valve must relieve at this safe pressure with tank water at any temperature, otherwise maximum safety from unnecessary tank failure is not assured under all conditions. Similarly, pressure relief valves must close again or reseat, at pressures above line pressure; otherwise there would be a continuous discharge or loss of water through the relief element even after the dangerous condition had been corrected. Finally, since pressure relief valves are expected to operate satisfactorily so long as the storage tank is in operation, long exposure to hot water must not seriously affect their performance.

Figure 2

Experimental boilers and other equipment used by the A. G. A. Laboratory for testing pressure, temperature, and vacuum relief and automatic gas shut-off valves

In view of the above outlined service ordinarily expected from pressure relief valves, the following tests were conducted by the Laboratory on pressure relief elements during its investigation. First, relieving pressures were measured at different test water temperatures, extending from 70 to 212 degrees Fahrenheit, and these pressures compared with one another and with the pressure for which the valve was adjusted to relieve by the manufacturer; second, the pressure of valve reseating was determined at the temperature of each relieving pressure test; third, the capacity of the valve for the discharge of hot water after relief was determined, and fourth, valve leakage and resistance to deterioration by long exposure to boiling water were investigated. Space will not permit a detailed discussion of the effects of the widely varied particulars of pressure relief valve design upon these indices of operation, but a brief resumé of the general results secured in the investigation of these accessories may prove helpful. With nearly every pressure relief valve, the relieving pressure was found to vary with the tank water temperature. In many instances variations were so great that valve operation could be rendered wholly unsatisfactory by moderate changes in water temperature. Figure 3 illustrates this point. Here are shown representative relationships between test water temperature and relieving pressure. Reseating pressures were also found to vary with water temperature, and in much the same manner as did relieving pressures. In regard to discharge capacity, the sizes of relief openings were, in every case, shown to be more than sufficient to handle the requisite amounts of water from the standpoint of limiting pressures generated by the thermal expansion of water in closed systems. Leakage through joints and along stems, however, was a frequently observed deficiency in valve construction and improper contact between valve discs and seats another. In addition, some of the valves studied were found to be incapable of operating correctly after long exposure to water at 212 degrees Fahrenheit. Notwithstanding, however, the wide divergence in design features and operating characteristics of pressure relief valves, it has been found possible, on the basis of extensive tests, to formulate requirements which will assure safe tank pressures in water heaters under all reasonable conditions, if valves meeting such requirements are installed on them. These requirements are at present being reviewed by the interested subcommittees of the A. S. A. Sectional Committee, Project Z-21, and it is expected that they will soon be completed

§ Systems in which a check valve is included in the inlet water line or in which that line has been blocked by corrosion products, by a defective water meter, or by the closure of valves intended to be left open.

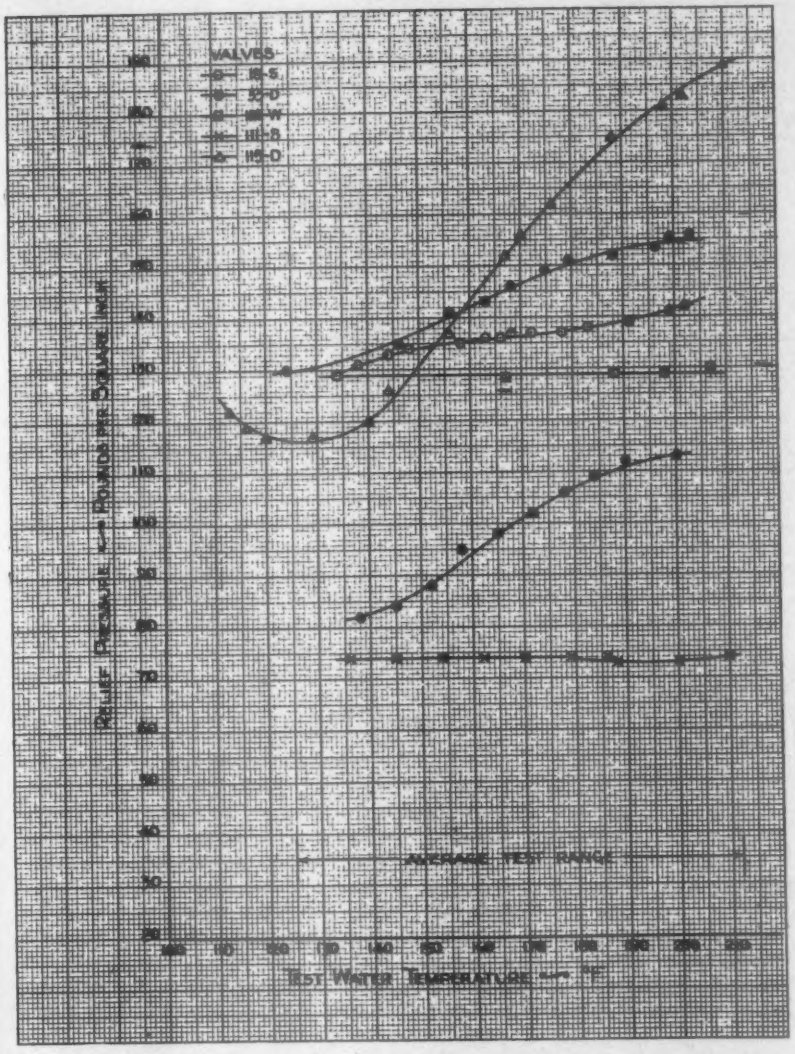


Figure 3

The effect of test water temperature on the relieving pressure of a representative group of pressure relief elements

in tentative form and published for criticism.

Temperature relief valves are similar to pressure relief valves in that they are designed to prevent explosions of hot water storage vessels. Nevertheless, the functions of the two types of devices, although of equal importance, and dedicated to serve the same general purpose, are quite different. Temperature relief valves, though not directly capable of forestalling tank rupture (the result of abnormally high water pressures) do eliminate the hazard of explosion by preventing the accumulation of dangerously overheated water in storage tanks. Whenever unsafe temperatures are approached, relief devices of this type permit hot water to escape from the tank through a relief outlet or drain and be replaced by cold line water. Temperature relief units are of two general types, namely, fusible plug and reseating valves. In the case of the fusible plug type, relief is occasioned by the melting of a small pellet, plug, disc, or core of special alloy which fuses at the relief temperature and opens a relief passageway for the tank water. Such valves, after relief has occurred and the hazard-creating condition has been corrected, must either be replaced or equipped with new fusible elements. Reseating type temperature relief devices, on the other hand, require no attention after operating, for the valve systems of such devices are actuated by bimetallic discs, expansion bellows, differential expansion rods, or liquid-filled units which resume their original shape or placement when the water temperature recedes back to normal.

A temperature relief valve must be capable of certain specific functions if it is to prevent the possibility of tank explosions and thus render the protection desired. First, relief must occur at stored water temperatures sufficiently low to preclude explosion even in the event of tank failure; second, when relief occurs, hot tank water must be discharged as cold water takes its place; third, water must be discharged at a rate sufficient to withdraw heat from the system faster than it is delivered by the heating unit; and fourth, such operation must be assured at any reasonable tank water pressure. It was primarily from these four standpoints that the 26 temperature relief elements tested in this investigation were considered, although the performance of the valves from the standpoint of temperatures of reseating water leakage, and resistance to deterioration by exposure to hot water was also studied.

The location of a temperature relief valve in the system affects to a considerable extent the temperature of the stored water at the time of relief. The results of the Laboratory's study showed that when valves were so situated that their thermal elements were immersed in, or were very close to, the hottest portions of the tank water, relief was effected at lower stored water temperatures than if they were placed at some distance from the tank where intervening water columns would tend to insulate them from the hot tank water. Likewise, when placed in circulating lines or on hot water lines through which water was flowing as a result of drawing or internal circulation, the measured stored water relief temperatures of valves were generally less than those temperatures when the valves were located in equivalent "dead end" lines containing stagnant water. On the other hand, if valves were situated in cold water lines, cold inlet water was discharged when relief occurred, and any dangerously overheated water within the tank was not drained away. Thus, the important role in temperature relief valve operation played by the manner of valve installation was made apparent.

The hydrostatic pressure existing within the tank at the time of temperature relief also influences the measured relieving temperatures of all reseating type devices. The valve mechanisms of such units are always acted upon by three forces; namely (1) the closing force acting on the valve disc, i.e. the pressure of the spring or the flexed bimetallic element, (2) the opening force which is augmented by increasing the temperature of the thermal unit, and (3) the force of water pressure within the tank. This last component may tend to either open or close the valve, depending on the valve's construction. The relieving temperature of a valve is, therefore, either decreased or augmented as the tank water pressure increases, depending on whether the construction of the valve is such that the water pressure tends to open or close the valve.

American Gas Association construction and performance standards being drafted for temperature relief devices will take into

account the above considerations and will thereby provide users of valves of the proper capacity which meet such standards, with the assurance that hazards attendant to excessive stored water temperatures will be obviated.

Very frequently in practice both pressure relief and temperature relief features are incorporated in one protective device. Such attachments are popularly known as combination valves. Ordinarily, in units of this nature, the pressure and temperature relief elements operate independently of each other and may be considered as two separate units in the same housing; but in certain instances the two forces tending to relieve conditions of excessive pressure and temperature, respectively, act upon the same valve and seat. In such cases the interaction of the two elements often results in peculiar operating characteristics. In the Laboratory's investigation of combination valves these effects were probed by testing in duplicate. For example, when the relieving temperature was being studied two similar tests were run for each test condition; one with the combined pressure relief element adjusted at its minimum relieving pressure, the other with that element adjusted to its maximum operating pressure. In general, it was found that combination valves were of high standard, but that their satisfactory performance depended upon proper installation. When installing such valves the combination device must be placed in the correct position for temperature relief, i.e. in such a position that the heat from the stored water is easily communicated to the thermal element, and hot tank water (not cold inlet water) is discharged when relief occurs.

Pressure and temperature relief devices discussed above are applicable to any type of hot water storage system. There is another type of protective device, however, the gas shut-off valve, which is designed for use only on gas water heater systems and which tends to insure further safety. This valve prevents the hazards of storing overheated water by automatically shutting off the gas supply to the burner when unsafe temperatures are approached. In this group of attachments, gas valves in the supply line are held open against powerful mechanical closing forces by rods restrained from longitudinal or angular motion by solidified special fusible alloys or chemical cartridges. Thus when the operating temperature is reached, the alloy melts or the cartridge reaction takes place, the restraining element is permitted to move, and the valve closes. Resetting of gas shut-off valves may only be accomplished manually, either by replacing destroyed fusible discs or chemical cartridges or by means of special spring and ratchet mechanisms. In order for such valves to perform properly their desired functions, the thermal element must be located so as to be exposed to the heat of the stored water, the valve in the closed position must not leak gas, and water must not be able to find admittance to gas passageways.

Gas shut-off valves, in general, were shown to be very consistent in performance, due probably to the fact that their actuating and valve elements are shielded from direct contact with tank water, and variations in test pressure, therefore, have no effect on their operating temperatures. In addition, most gas shut-off units have immersion elements which extend directly into the tank water. Thus the conditions of water flow within inlet, outlet, and circulating lines, and the arangements of connections have negligible effect upon shut-off temperature.

The last and least frequently used protective attachment studied in this investigation was the vacuum relief valve. Such devices are designed for use on any type of hot water storage vessel. They are usually a part of, or attached to, pressure, temperature, or combination relief devices, and are ordinarily light valve systems held shut by light weight springs. These are so arranged that opening may occur only when the atmospheric pressure outside the tank, acting to open the valve, is somewhat above the water pressure within the tank, acting to keep the valve shut. Thus vacuum relief elements protect tanks only against collapse caused by the existence within the tank of vacuum conditions. Such a situation might possibly be brought about by too rapid draining of the tank or by breaks in the inlet water line or water main at points considerably below the level of the heater.

When a vacuum relief valve operates, air is permitted to rush into the tank and take the place of displaced water. Hence, in studying these attachments, along with the relieving vacuum, the air passing capacity of each valve at a maximum allowable tank vacuum was studied. All the valves studied seemed to possess sufficient capacity to forestall failure of ordinary tanks which are not too seriously weakened by corrosion or other conditions. Certain difficulties were, however, encountered with protective devices of this class. These concerned water leakage and valve deterioration by long exposure to hot water. In many cases seating was imperfect after first relief, or valve discs were warped by continued immersion in hot water.

The discussion just completed concerning pressure, temperature, vacuum, and combination relief valves and gas shut-offs is far too brief, of course, to present even an approximation of the complete picture of the design, construction, and performance of water heater protective devices, but it does indicate the many and divergent factors which affect the degree of protection such appurtenances afford in domestic water heater operation. From this study of relief and automatic gas shut-off valves it has been possible to crystallize certain specific standards for safety which, when satisfied by any relief or shut-off unit, guarantee reasonable protection from the hazards of tank failure and explosion. A code for these devices will be incorporated in the American Gas Association Listing Requirements for Gas, Pressure, and Temperature Control Accessories which will shortly be released for criticism. It should be remembered that these requirements will represent only "minimum" standards for safe operation, satisfactory performance, and substantial and durable construction. They will not discriminate on matters of ingenuity of design or improvement, nor place relative evaluations upon different valves. Their sole purpose will be to serve and protect the gas consuming public by assuring users of listed valves of safe, satisfactory, and reliable performance.

Research Studies

C. UPTHEGROVE is the author of a pamphlet entitled "Scaling of Steel at Heat-Treating Temperatures," published as Engineering Research Bulletin No. 25 by the University of Michigan. This work presents the results of an investigation of the scaling of steel which was sponsored at the University of Michigan by the Industrial gas Research Committee of the American Gas Association.

Studies were made of two phases of the general problem of scaling. In the first part of the work the individual factors which affect the scaling were investigated. These are: Temperature, time of exposure to scaling medium, rate of flow of scaling agent, partial pressure of the scaling agent, and the nature of the scaling agent itself. Scaling determinations were made for each of the four simple scaling agents, dry air, oxygen, carbon dioxide and water vapor, over the temperature range 1000° to 2000° F.

In the second phase of the investigation, the results of the first part or the fundamental studies were carried over to the complex type of atmosphere. Studies were made of the effect on scaling losses for groups of carbon and alloy steels of different combustion atmospheres, varying from those carrying small percentages of free oxygen to those carrying high percentages of carbon monoxide. These atmospheres were obtained by burning manufactured gas with different gas-air ratios.

The scaling of any steel is shown to be related to the temperature, the nature of the scaling agent, the time of exposure, the dilution of the scaling agent by nitrogen, and its velocity of flow.

German Paper Translated By L. M. Vander Pyl

THE article entitled "Expansion Correction of Contraction Coefficient of Orifices," by A. Busemann, which appeared in *The Monthly* of November, was translated from the German by L. M. Vander Pyl, chief chemist of the Pittsburgh Equitable Meter Company, Pittsburgh, Pa. Credit to Mr. Vander Pyl was omitted at the time of publication of the paper and this belated acknowledgment is made herewith.

MANUFACTURERS' SECTION

JOHN A. FRY, Chairman J. SCOTT FOWLER, Vice-Chairman C. W. BERGHORN, Secretary MERRILL N. DAVIS, Vice-Chairman

Taking Part in Association Work*

By W. E. Derwent

President, Mid-West Gas Association

MY opinion of the value of organization is quite fixed, and the history of my activities in association work is convincing proof, I believe, that I appreciate the value of organization.

I notice in every industry, in every line of business or profession, it is the busy men, the live wires, the men who are up and coming, who are most active in their organization work. I won't attempt to say which is the cart and which is the horse, but as a rule, personal activity and association activity go together.

It is the big men of the gas industry who make up the membership of the gas associations and actively promote their welfare; in fact, in any industry you find always the big men in it are the leaders in their own respective associations. Their membership is the cream of the industry. They are men who are used to doing things.

Why is this true? Why is it that we find the leaders in every line of business activity in their respective associations? I don't think they are particularly and peculiarly philanthropic by nature. They have no time to waste. They don't join simply because they are asked to join. They are big enough to say "No" without batting an eye.

Why do they give their time and money to other societies? Why do they organize and sustain their organizations? Because they need them in their business. They have found them necessary, that's all. It is just pure, cold-blooded business!

Now, what are some of the advantages?

First, it is necessary that an industry have a voice that is recognized as authoritative. It has been said that nine-tenths of the trouble of an industry arises from the fact that it is not unified.

There is no authoritative voice to speak for this industry or for that one; instead, there is a babble of tongues and this results in confusion in all industries, including that of our own, unless it is organized so as to sustain and crystallize the ideas and the wishes of its members, and to make those known.

Gas associations, under the direction of the parent association and with it, are now doing things.

We are just starting, to be sure, to eradicate the old abuses that existed between companies, and in the industry between members of the gas industry and the manufacturers' members.

It is the function of an association to do for the industry what the individual member alone cannot do.

Secondly, in addition to fighting the industry's battles, and all industries have them, it is the prime function of an association to improve an industry by the dissemination of information.

Of course, if a man knows everything there is to know about the gas business, if he has absorbed all that the wise men of the industry know, and if he has all his mind will hold, he does not need this feature of association work. But if he suspects that he has a few problems in his own business that are not solved, if he hopes to avoid some mistakes that he must be making, if he hopes to do a better job that merits greater reward, if he is going to do a better job in 1933 than he did the previous year, or years, if he will take advantage of his association to rub elbows with his fellowmen in the industry, to make contacts, and to listen to the experience of others, to profit thereby, then he needs and wants association membership and activity.

That's not all, for there is a third reason, and probably the biggest one of all for membership in gas associations or any other association for that matter and that is, the advantage that membership gives you an opportunity of doing something for the other fellow.

I said earlier that the busiest man, as a rule, gives the most time and the greatest attention to association work. I think the answer to this is that the man who has sufficient vision and initiative and energy to make a success of his own business has the vision to see that he is selfishly interested in the success of the entire industry.

A failure of a major operator casts its shadow over the entire industry. This casts a shadow of reflection upon him and his business and if too many failures in his line of business occur, his credit is affected.

Success breeds success and failure breeds failure. Pessimism breeds pessimists. Optimism breeds optimists. Let's all be optimists, and let's each admit, as optimists, that we are selfishly interested in the success of our fellowman, even our competitors.

It is a "give and take" proposition—association work—and you gain in about the proportion you give.

* Remarks before 1933 Convention.

Convention Calendar

December

4- 9 American Society of Mechanical Engineers
New York, N. Y.

6- 8 National Society of Refrigerating Engineers
New York, N. Y.

January 1934

23-26 American Institute of Electrical Engineers
New York, N. Y.

26-28 American Society of Heating & Ventilating Engineers
Detroit, Mich.

February

5- 8 American Society of Heating & Ventilating Engineers
New York, N. Y.

8- 9 New England Gas Association Convention
Boston, Mass.

15-16 Mid-West Regional Gas Sales Conference
Hotel Sherman, Chicago, Ill.

March

6- 7 Oklahoma Utilities Association
Mayo Hotel, Tulsa, Okla.

May

1- 4 U. S. Chamber of Commerce
Washington, D. C.

14-18 National Fire Protection Association
Atlantic City, N. J.

24 National Board of Fire Underwriters
New York, N. Y.

June

18-21 National Association of Purchasing Agents
Cleveland, Ohio

25-29 American Institute of Electrical Engineers
Hot Springs, Va.

September

9 American Trade Association Executives
Wernersville, Pa.

October

Wk. 29 American Gas Association
Auditorium, Atlantic City, N. J.

ACCOUNTING SECTION

E. B. NUTT, Chairman H. W. HARTMAN, Secretary A. S. CORSON, Vice-Chairman

Pending Legislation Concerning Utilities*

By Ray Garrett

I WAS astonished to find, in the report of the Section on Public Utility Law of the American Bar Association, which contains a very comprehensive list of statutory enactments for the year of 1933, no less than ten acts of Congress and an aggregate of 117 laws enacted by thirty-nine of the State legislatures up to July 1 (and they had not all adjourned) as the 1933 contribution of statutes affecting utilities.

First, I can dispose of the acts of Congress by merely mentioning their names, knowing that nothing has been so widely discussed in the public press as the recent enactments of Congress. The mention of these acts will indicate to you what has been done, nationally. First is the N. R. A. Next is the Federal Securities Act, which affects utilities as well as other corporations. That is a fit subject for days of argument by those who pretend to know what it means. Then, and perhaps more important to you, is the creation of the Tennessee Valley Authority, which places the Federal government in the public ownership and operation of a utility. How far that will go, no one seems to know. Then, there is the creation of a Co-ordinator of Transportation, limited, of course, to the railroad field. Who knows but what there might be a co-ordinator of the gas industry some day? Further, there is the continuation of the powers of the Federal Trade Commission to investigate the inter-state power business, as well as securities, publicity campaigns and propaganda and other things relating to interstate commerce. Finally, there is the creation of several new taxes—the Federal capital stock tax, the Federal excess profit tax, the transfer of the electrical energy tax from the consumer to the company, and the tax on dividends, which puts a company to considerable cost in time and expense to collect for the government. I am presuming that you are familiar with all of those enactments.

Next, I can dispose of the enactments of most of the states by quoting some statistics. In the American Bar Association, Utility Section, report, I find that twenty-six States enacted statutes regulating and taxing motor vehicles for hire. I take it you are not interested in that. Then, seventeen States enacted statutes having to do with various forms of public ownership and operation of utilities. I know you are interested in that, but I hardly know how to approach it, because it is a subject much older than I am. Further, fourteen States have revised their tax laws by incorporating various sales, occupation, gross and net income taxes and revising their general property taxes. Four States in the East have seen fit to provide laws whereby their commissions can act jointly with the commissions of neighboring States in certain interstate power rate cases. Three States have imposed new laws for the regulation of the issuance and sale of securities by utilities.

You may wonder what is left. Well, there are two large groups of new laws which I thought would be of more interest to you than all of the others I have mentioned.

New Law in Maine

The first of these groups comprises the laws enacted in eight States for the control of holding companies. For a long while various States have desired to control holding companies but could not find any adequate way in which to do so. The holding company was not a utility and was generally incorporated in a foreign State. Finding no way to control holding companies directly, they have approached the holding companies through the operating companies, and there are now eight varieties of statutes in force in these eight States.

The simplest act is in the State of Maine, and I think I can give you a better idea of the scope of that enactment by reading a few lines than by paraphrasing. In Maine, the Legislature has said:

> "No public utility doing business in this State shall extend credit or make loans to or make any contract or arrangement, providing for the furnishing of management, supervision of construction, engineering, accounting, legal, financial or similar services, or for the furnishing of any service other than those above enumerated, with any corporation, person, partnership or trust, holding, controlling or owning in excess of 25% of the voting capital stock of such public utility, or with any other corporation, which is itself owned or controlled by or affiliated with any corporation, person, partnership or trust, holding, controlling or owning a majority of the voting capital stock of such public utility, unless and until such contract or arrangement shall have been found by the public utilities commission not to be adverse to the public interest and shall have received their written approval."

Couched in that language you may not be able to discern its meaning, but the legislature is saying that no holding company owning more than 25 per cent of the operating company stock can enter into a contract with the operating company for management or other services without the approval of the commission. Likewise, a subsidiary operating company having a sub-operating company is limited in the same fashion. That gives the commission an opportunity, with statutory authority, to dig into a lot of transactions between the operating companies and the holding companies which, by the statute, are presumed to be against the public interest.

Other states have gone far beyond the State of Maine. In Illinois, for instance, the legislature has approached the subject in this fashion:

> "The commission shall have jurisdiction over holders of the voting capital stock of all public utilities under the jurisdiction of the commission to such extent as may be necessary to enable the commission to require the disclosure of the identity in respective interests of every owner of any substantial interest in such voting capital stocks. One per centum or more is a substantial interest, within the meaning of this subdivision.
>
> "The commission shall have jurisdiction over affiliated interests having transactions, other than ownership of stock and receipt of dividends thereon, with public utilities under the jurisdiction of the commission, to the extent of access to all accounts and records of such affiliated interests relating to such transactions, including access to accounts and records of joint or general expenses, any portion of which may be applicable to such transactions; and to the extent of authority to require such reports with respect to such transactions to be submitted by such affiliated interests, as the commission may prescribe. For the purpose of this section, the phrase 'affiliated interests' means:
>
> "a. Every person and corporation owning or holding, directly or indirectly, ten per centum or more of the voting capital stock of such public utility.
>
> "b. Every corporation and person in any chain of successive ownership of ten per centum or more of voting capital stock.

* Abstract of address before Accounting Section, A. G. A. Convention, Chicago, Ill., Sept. 26, 1933.

"c. Every corporation, ten per centum or more of whose voting capital stock is owned by any person or corporation owning ten per centum or more of the voting capital stock of such public utility, or by any person or corporation in any such chain of successive ownership of ten per centum or more of voting capital stock.

"d. Every corporation, ten per centum or more of whose voting securities is owned, directly or indirectly, by such public utility.

"e. Every person who is an elective officer or director of such public utility or of any corporation in any chain of successive ownership of ten per centum or more of voting capital stock.

"f. Every corporation which has one or more elective officers or one or more directors in common with such public utility.

"g. Every corporation or person which the commission may determine as a matter of fact after investigation and hearing is actually exercising any substantial influence over the policies and actions of such public utility even though such influence is not based upon stock holding, stockholders, directors or officers to the extent specified in this section."

I don't think we should fail to compliment the author of that section for completeness in definition. It has caused a lot of confusion among Illinois utilities, trying to find out with whom they can do business and with whom they can not do business without the commission's approval.

The percentage of stock ownership which controls affiliated interests varies from 25 per cent in Maine to 5 per cent in the Northwestern States. Perhaps that sort of legislation is of more worry to lawyers than to accountants, but bear in mind that I am in my territory and not in yours.

Second Group of Laws

Another group of laws, comprising a class of legislation which 1933 placed on the statute books, is one which the American Bar Association report classified as "making administration more effective." Thirteen States have indulged in this sort of legislative exercise. I cannot describe the acts in all of these thirteen States, but I shall select a few which will give you the drift of this legislation.

For instance, in Illinois, the legislature has provided that the commission shall have the power to declare emergency rate reductions. Commissions throughout the United States have long had the power to enter emergency rate orders but the orders must be on the emergency side upwards, otherwise complications result. Illinois has been so bold as to provide by statute that the commission can, without a hearing, enter an emergency rate reduction order. I do not know whether the commission will ever try to use that authority, but if it does, the courts will promptly get an opportunity to test the constitutionality of the act. The legislature failed to distinguish between an emergency increase in rates, which is not confiscation from the utility's standpoint, and an emergency reduction in rates, which may mean confiscation. You know what I mean by confiscation through a reduction of rates—the utility's property is taken without due process of law. The due process provided by this legislation is nil, because you have no opportunity to be heard.

Furthermore, the State of Illinois has undertaken another experiment in the form of control of dividends. Let me read you extracts from the law on this subject.

> "Section 27a. (1) Whenever the commission finds that the capital of any public utility has become impaired, or will be impaired by the payment of a dividend, the commission shall have power to order said public utility to cease and desist the declaration and payment of any dividend upon its common and preferred stock, and no such public utility shall pay any dividend upon its common and preferred stock until such impairment shall have been made good"

Now, corporation statutes generally prohibit the payment of dividends when capital is impaired, anyhow, but this new statute did not stop there. The legislature said:

> "(2). No utility shall pay any dividend upon its common stock and preferred stock unless—
>
> "(a). The utility's earnings and earned surplus are sufficient to declare and pay same after provision is made for reasonable and proper reserves.
>
> "(b). The dividend proposed to be paid upon such common stock can reasonably be declared and paid without impairment of the ability of the utility to perform its duty to render reasonable and adequate service at reasonable rates.
>
> "(c). It shall have set aside the depreciation annuity prescribed by the commission or a reasonable depreciation annuity if none has been prescribed."

The last section will interest some of you who are presumed to be well acquainted with depreciation policies and theories of utilities throughout the country. Here, in Illinois, depreciation now must be provided for in a reasonable amount before dividends can be paid. If the commission has prescribed the amount or formula, then that must be set aside; if the commission has not so prescribed, then the question of reasonableness of the amount set aside becomes a question of fact upon which no two persons, expert or otherwise, will agree.

About Dividends

Then the act further states: "If any dividends on common stock are proposed to be declared and paid other than as above provided, the utility shall give the commission at least thirty days' notice in writing of its intention to so declare and pay such dividends and the commission shall authorize the payment of such dividends only if it finds that the public interest requires such payment."

The substance of this act leads you to the conclusion that, while the general corporation law and the general law on the subject of dividends would preclude the corporation from declaring and paying dividends where the earnings were insufficient, the commission is here given the authority to approve the dividends even though you have not the earnings and the surplus out of which to pay them. That is perhaps due to the very loose use of the term "dividends" as distinguished from a species of liquidation. However, one can hardly conceive of a situation where the public interest would require the payment of a dividend.

Illinois has gone one step further in its legislative enactments by saddling the cost of audits and appraisals upon the utilities up to one-half of one per cent of the gross operating revenue of the utility for the previous year. It would be possible for the commission to order such an audit and appraisal regardless of who started the proceedings. To convert that into figures, the Commission can order audits and appraisals of the local The Peoples Gas Light and Coke Company at an annual cost to the company of $150,000 per year, without limitation, without objection and without a hearing.

Lawyers familiar with public utilities have long advocated some changes in commission procedure and commission organization laws that would put the commission more in the position of a judicial or fact-finding body and remove from the commission the temptation to find facts to support a preconceived notion, especially in rate cases. Many manifestations of the ability of commissions to function in this dual capacity at the present time are noted in the newspapers.

Arkansas is now trying such an experiment. This year it established what they call a fact-finding tribunal separate from their corporation commission. The fact-finding tribunal is said by the statute to be composed of appointees who shall have among them "one skillful lawyer, one expert accountant and one expert engineer," whose duty it will be to take testimony and hear questions of fact and, after hearing the facts and conducting hearings, to make findings of fact which will be binding and conclusive upon the corporation commission in a rate case and, according to the statute, upon the courts. The courts do not generally recognize that findings of administrative bodies are conclusive on the courts, but, at any rate, the administrative body that fixes the rate will not be the body that finds the facts, in Arkansas. If the facts are properly found, the rate would seem to be more of a mathematical determination than otherwise. That type of statute may become more and more popular in future years.

Experiment in Indiana

Indiana has undertaken an experiment in the form of a statute providing that going

concern value shall not be included in any valuation for any purpose. Constitutions are being generously ignored these days, both nationally and in state legislatures, but here is one experiment that I think is doomed to failure. The Supreme Court of the United States has already said that going concern value is an element of value and perhaps they will get a chance to confirm it if the Indiana Commission undertook to enforce its new statute. I believe that the commission has already decided that the statute may not be so good. It is admitting evidence of going concern value, but without saying what the effect of the evidence is to be.

The two States that have shown the most radical tendencies in their utility regulations are the States of Washington and Oregon. They are noted for peculiarity in legislation. I want to review briefly some of the things that the State of Washington has done.

First, it has taken control of the budget. On the first of November of each year the officers of utilities are required to submit to the commission both operating and construction budgets. The commission is to review these budgets and if it finds any items of expense that are unwarranted or unjustified or that it does not like, it can reject such items. The penalty is this: the utility can go ahead and spend the money even though the commission has rejected the item, but the rejected item is forever excluded from operating expenses, or, if it is a construction item, from the property to be valued in a valuation case.

Furthermore, the State of Washington has provided that no utility can declare and pay dividends on its common stock without notice to the commission and submission of the proposed dividend for advance approval. The commission has the power to enter cease and desist orders. In case a corporation in the State of Washington is fortunate enough to earn more than the reasonable return which the law allows (and that has happened in the past), the State recaptures the excess and requires the corporation to put it in a reserve and use it for one of three specific purposes, viz.: to make up losses in reasonable return that may be incurred in some future year, or to replenish some contingent fund, or to use it for the benefit of the consumers as the commission may determine.

While the Washington Legislature was at it, it found a few more things to legislate about. For instance, merchandise sales and capital are excluded from the utility's property and business. Security sales by employees are so restricted that they may not sell securities during working hours or be required to purchase securities or be subject to what the coal miners call the "check-off" system of subscribing and having installments taken out of their pay. It has reestablished the depreciation fund theory and requires that depreciation be set up on the books and maintained. Apparently depreciation is intended to be a fund because, through the recapture of earnings, they intend to keep that depreciation maintained in some form, and not merely an earmarked surplus account. Also, it has added the cost of audits and appraisals to the utilities without limitation as to the amount, but with provision for a hearing.

Emergency Clause

After legislating on all these subjects, I was quite amused by the emergency clause inserted at the end of the statute to put it into effect immediately. It says: "This act is necessary for the immediate preservation of the public peace, health and safety, the support of the State government and its existing public institutions."

When all of these various experimental statutes of the State of Washington are assembled, we find that the State has taken over all of the duties of the board of directors, the executive, finance and budget committees, officers and management in general. How nice it would be for an executive in the State of Washington: He would have only the responsibilities of a clerk or office boy, but perhaps salaries would be fixed accordingly.

Under that type of legislation the State decides: first, what you can earn; second, what you can spend; and third, what you can do with the difference, if any. The State has gone into partnership with the utility corporations; but a partnership of a species not recognized in law, because the State participates in the profits and does not share in the losses. You make money, if you can, in spite of the law. If you make more than the State intends, you must share it with the State. If you make less, you must get along anyhow.

If all of the experiments I have mentioned should be incorporated into the laws of one State, I fear that you would be inclined to let the State take the business and look for something else to do.

You may wonder why I have spent so much time on the laws of States in which you may have no concern. You are presumed to know the laws of your own State, and to that extent I may have mentioned matters which you already know, but these novel and experimental statutes should be of interest to you even though you are not directly affected. If anything I have mentioned has attracted your attention, it is worthy of more careful investigation on your part.

Legislators are given to fads. One State gets an idea and puts it on the statute books. Another State hears of it and decides to try it out. The first thing you know, it has become general throughout the States, but with endless variations. Then, some individual or organization prepares a uniform law on the subject and goes to the legislatures of the various States in an effort to get them to adopt the uniform law on the subject. Generally, by that time, if it is particularly harmful, the lawyers have found some way to get around it anyhow; but sometimes the movement gains headway very rapidly and the lawyers can neither stop it or dodge it.

In reflecting on these various experiments, you may expect in 1935 when a new crop of legislation appears on the statute books, some of these ideas that now seem amusing may become laws of your own State and be laid on your own doorstep. You need to know what the trend is, and, if you think it is desirable, be on your guard.

His Hens Back on 8-Hour Day

IT'S a good thing there's no code for hens—a good thing, at least, for Vernon Elder, sixteen-year-old poultry enthusiast of Burlingame, Calif., according to "P. G. & E. Progress."

In the absence of fixed hours for egg layers, Vernon makes his flock do 14 days' work a week. He claims he gets twice as many eggs as he did when his chickens set their own hours.

All they get for putting in double time is an extra breakfast.

Of course, there's a trick in it. A large electric light in the henhouse, with an automatic clock to switch it on and off, fools the hens. They are made to believe that there are two days and two nights in every twenty-four hours. So they—but here's the story as Vernon wrote it:

"The automatic clock turns on the electric light in the middle of the night. The chickens think it's morning, so they hop down from their roost and eat the food which awaits them. And, whereas Dad reads the paper after his breakfast, a hen always lays an egg after hers. An hour later the light goes off and darkness drives the hens to sleep. As the sun rises the chickens again hop from the roost and start a new day. Another breakfast is served and, since the nature of the bird causes her to seek the nest after her morning meal, egg number two is laid."

There's only one drawback to Vernon's plan to keep his hens working two shifts a day. The clock he uses to operate the light belongs on the family's automatic gas furnace. So, when cold weather set in, Dad Elder dismantled the henhouse invention—and the hens have gone back on an eight-hour day.

Have You Changed Your Address?

American Gas Association,
420 Lexington Avenue,
New York, N. Y.

Below is my new address:

Name .....

New Address.....

.....

Old Address.....

.....

INDUSTRIAL GAS SECTION

F. B. JONES, Chairman C. W. BERGHORN, Secretary J. F. QUINN, Vice-Chairman

Pittsburgh Domestic Appliance Show Features Industrial Gas Exhibit

By H. J. Williams

Equitable Gas Company

DURING the week of September 25-30, the gas companies serving the Greater Pittsburgh (Pa.) District, promoted their first domestic gas appliance show. This display was situated near the Better Homes Exhibit on the third floor of the Gulf Building. The primary purpose of the show was to promote greater interest in modern gas appliances for the home. In this respect it was successful, for the participating gas companies and appliance manufacturers all secured a list of prospects and closed many sales among the 5,000 visitors.

The visitors were routed through several aisles, the first of which consisted of several modern gas kitchens, a basement room displaying house heating equipment, and a laundry featuring a water heater and a clothes drier. The aisle terminated in a central room containing a huge box, enclosing 1,000 cu.ft. of space, which gave all a visual conception of the volume occupied by 1,000 cu.ft. of gas. This same room contained a display of products commonly found in the home, and which were made with the aid of industrial natural gas. Visitors then were directed through two aisles along which the appliance manufacturers' booths were located, and back into the central room again.

Part of Industrial Gas Exhibit at Pittsburgh Domestic Appliance Show

The space allotted to the display of products made with the aid of industrial natural gas, occupied one wall of the central room.

The idea behind this industrial display was to emphasize the fact that natural gas is used in some process of the manufacture of practically everything found around the home. In order to do this, many of the local industrial gas customers who manufacture products used in the home, were to contribute a few samples or articles that could be placed in the display. All were eager to cooperate, and the difficult problem was not to secure sufficient material, but rather to restrict the customers' display to the space available.

Following is a list of some products included in the exhibit:

A panel of copper products, roofing materials, spouting, nails; a panel of wrought iron hardware; steel wire products—nails, wire rope, chicken wire, screen door springs; stainless steel products; building brick and clay products; wall board and lumber; iron and steel pipe and fittings; electric wire and conduit; paint, varnish, and lacquers; electric fixtures and lamp bulbs; bathroom equipment; wall and floor tile; linoleum; tooth paste tubes and caps; razor blades; shoes; bed spring and mattress; cloth, artificial silks; glass bottles and jars; bottle caps and jar lids; cardboard boxes and wax paper; mirrors and picture frames; pictures and printed material; chinaware—bisque, glazed, and finished; glassware and goblets as blown, cut, and finished; stainless salt shaker tops; kitchen utensils, aluminum, stainless, and enameled ware, and food products.

The part natural gas plays in the production of each of these items was briefly summarized on small display cards.

When the show opened it was found that this industrial display attracted so much attention that one man was stationed in the central room to describe it to visitors. He found that women were particularly interested and surprised when they found that all these articles were made with the aid of natural gas. It was also found that items shown in the various stages of manufacture, such as the chinaware and glass goblets, have an educational appeal that enhances their attention-getting possibilities. These items were of more than ordinary interest to the visitors.

An analysis of this exhibit indicates that displays featuring industrial applications of gas, can be used to help develop the domestic load by making the public more gas-conscious. Undoubtedly some of the drawing power of a display of an industrial nature in a domestic appliance show, is due to the fact that it was new, unexpected, and exhibited articles familiar to the average domestic customer. All domestic customers know that ranges, water heaters, and house heating boilers use gas and consequently expected to find such appliances in a domestic appliance show, but the fact that practically everything in the home is made with the aid of natural gas came as a surprise, especially of the women, and secured the attention that naturally goes to the unusual.

Stressing the idea that natural gas is widely used in manufacturing so many different articles, undoubtedly helps to impress people with the adaptability and economy of natural gas as the modern fuel to fulfill the heating requirements in their homes. Consequently, these peo-

(Continued on page 521)

Another glimpse of Industrial Gas Display at Pittsburgh Exhibition

HOME SERVICE COMMITTEE

DOROTHY E. SHANK, Chairman JESSIE McQUEEN, Secretary

Home Service Helps To Build and Retain Load in Philadelphia

Beatrice C. Wagner

THE potentialities of the home service department in building and retaining the gas load have received too little appreciation. This is the philosophy which has guided Miss Beatrice Cole Wagner, home service director of the Philadelphia Gas Works Company, Philadelphia, Pa., in expanding the activities of her department and advertising home service to the entire personnel of the company.

"In almost every phase of gas appliance selling there is some opportunity for the Home Service woman either to create prospects, clinch sales or keep the customer sold on the appliance," Miss Wagner said, outlining the program undertaken by her department this year.

"In addition to their routine work of following up sales of kitchen appliances, conducting regular cooking demonstrations on the sales floors and of assisting customers with cooking problems, our home service instructors are available at all times for special demonstrations in dealer stores and for talks on cooking, and other details of kitchen management before special groups, clubs, schools, etc.," she continued.

"Table-of-the-Month"—wedding breakfast

A model kitchen sponsored by Philadelphia Gas Works Company

"While the home service division is a 'service' organization in the fullest sense of the word and its cooking classes are conducted without the slightest tinge of commercialism, we exert an influence upon sales—for that very reason—of the most powerful sort!

"For example, when a cooperative dealer is appointed—whether he is a small neighborhood plumber or a large downtown department store, the home service department contributes a service in the form of a series of cooking demonstrations and lectures for his customers which builds immediate prestige and good will for the new enterprise. In some of the leading department stores of the city the model gas kitchens installed under the direction of the home service division have attracted more shoppers to their housewares departments than any previous event and has re-

(Continued on page 521)

TECHNICAL SECTION

O. S. HAGERMAN, Chairman H. W. HARTMAN, Secretary C. A. HARRISON, Vice-Chairman

Gas Detection Instruments

By S. S. Tomkins

Assistant Chief Chemist, Consolidated Gas Co. of New York

THE reliable and rapid detection of combustible and/or irrespirable gases in an atmosphere in the field has long been of interest to many industries. Numerous types of apparatus have been suggested or used for this purpose, including the various types of flame safety lamps; carbon monoxide detectors; combustible gas indicators of the hot wire type; explosion apparatus; density and diffusion apparatus; and detectors dependent on the measurement of the heat developed when combustible gases are brought into contact with catalytic materials; the contraction in volume due to combustion; and the refractive index and thermal conductivity of gases.

This paper briefly reviews the progress that has been made in gas detection instruments; summarizes the factors determining the suitability of apparatus for gas detection purposes in the field; and discusses the features of a newly developed portable gas indicator that should find many applications, particularly in the gas industry.

The literature states[1] that as early as 1700, coal mine atmospheres were examined in England for the presence of fire damp (methane, or a mixture of methane and air) by lowering a dog down the shaft in a basket. When the dog entered a level containing fire damp, he would howl, indicating the necessity for ventilation. The practice of using small animals, such as birds and mice, as gas detectors has been continued to the present time. Only last month the newspapers reported that a woodchuck was carried in the transatlantic airplane "The American Nurse" as a carbon monoxide detector.

Open candle flames were also employed in the early days of coal mining and it has been stated[1] that the miners became very expert in judging the general character of the atmosphere in this crude and unsafe way.

The danger and frequency of explosions in mines, due in part at least to the use of open flames, led Dr. W. R. Clanny about 1813 to design what was probably the first closed flame safety lamp. This lamp[2] consisted of a candle supported within a cylindrical body containing a window of thick glass. Air for supporting combustion was forced by a bellows through a tube and water seal at the base of the lamp, and the combustion products were discharged through a similar device at the top, the upper water seal also serving as a water jacket to cool the upper part of the lamp.

Shorty after the introduction of the first Clanny lamp, George Stephenson[3] (1815) designed a closed flame lamp in which air was admitted underneath the flame through tubes or a series of perforated plates and the products of combustion were discharged through a similarly protected outlet. One of the modifications of Stephenson's lamp was noted for its tendency to extinguish in explosive mixtures.

In the same year, Sir Humphrey Davy[4] revealed that a long tube, metal canal or wire gauze, with suitably proportioned openings, prevented the propagation of explosions; and that the light in the lamp would extinguish in an explosive mixture of fire damp and air.

In 1883, Marsaut[5] designed a lamp having two features that differed from its predecessors, namely, two gauzes and a shield or bonnet, both of which were important advances toward greater safety. The modern Wolf and Koehler lamps embody these improvements and in addition are equipped with internal igniters, eliminating the necessity for igniting the lamp from an outside source. Other important features of these latter two lamps are that they burn naphtha or gasoline instead of the heavier oils, and that the air for combustion enters the flame chamber through gauze-protected openings at the bottom, as well as through the double gauzes above the lamp chimney.

Flame safety lamps have been used for the detection of methane for over a century, and have proven comparatively satisfactory in this service.

In 1878, E. H. Liveing[6] described an indicator for detecting very small quantities of flammable gas and for estimating the proportion present. The Liveing indicator depended upon the principle that an electrically heated platinum wire in contact with an atmosphere containing methane, glows more brightly than a similar wire heated in pure air, the difference in luminosity being proportional to the amount of methane present. The Martienssen[7] detector of the present day operates upon a similar principle, the presence and approximate percentage of methane being shown by its effect upon the color or brightness of an electrically heated filament consisting of two legs of platinum alloy wire extending from terminals to a loop whose center has a coating of palladium salts.

In 1894, a U. S. Patent[8] was granted to B. C. Tilghman disclosing a type of gas detector that has come to be known as the hot wire type of combustible gas indicator, many modifications of which have appeared commercially within the past few years and have been adapted for use in many fields. The principle of this detector, as described in the Specification forming a part of the Tilghman patent, is that the burning of a combustible gas on the surface of an electrically heated metallic filament causes an increase in its electrical resistance, which is proportional to the amount of combustible present and which may be conveniently measured by means of a Wheatstone bridge.

It will be noted that the principle of the Tilghman detector is very similar to that of the living indicator, differing only in measuring the increase in the electrical resist-

Mr. Tomkins' paper on "Gas Detection Instruments" was adjudged the best of its kind presented before any A. G. A. meeting in 1932, and consequently he was presented with the coveted Beal Medal at the 1933 Convention in Chicago. In further acknowledgment of his splendid accomplishment, George B. Cortelyou, president of the Consolidated Gas Company of New York, wrote Mr. Tomkins as follows:

New York, N. Y.
October 4, 1933.

Dear Mr. Tomkins:

I note from the records of the A. G. A. Convention recently held at Chicago the award to you of the Beal Medal for the best technical paper presented at Association meetings during the year.

Mr. Morris advises me that your paper was inspired by the work which you and your department associates have been doing for the last two years in the development of an instrument for determining the presence of undesirable gases in manholes and other subsurface structures, and of the aid that this instrument has been in searching for potential hazards in the work of the Distribution Department, also aiding in the safe operation of our plants.

I am particularly pleased that a member of our technical staff has obtained this outstanding award.

With hearty congratulations, believe me,

Sincerely yours,

(Signed) Geo. B. Cortelyou.

Mr. Tomkins' paper was read before the Technical Section October 11, 1932, at Atlantic City, N. J.

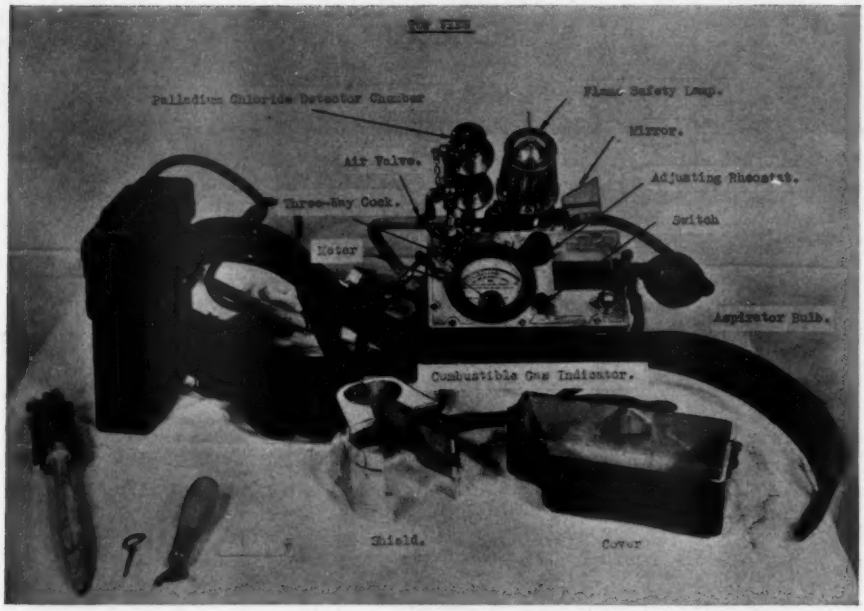


Figure 1

ance of a hot wire in contact with the atmosphere under test instead of the increase in luminosity. Several indicators now on the market utilize a further modification of this principle, measuring the increase in the temperature of the hot wire rather than its increase in luminosity or electrical resistance.

The Shaw gas tester[9] which depends for its operation on the explosive properties of mixtures of methane and air, was also described as early as 1894. This apparatus was a cumbersome laboratory device, requiring considerable time to make a test. It is of interest however, because the modern, portable Jones gas detector utilizes the same principle.

In 1915, G. A. Burrell[10] developed a portable methane detector operating on the principle that the contraction in volume caused by burning methane in air is a measure of the quantity of methane present. Recent commercial models of this indicator may be obtained with scales calibrated to indicate the percentages of petroleum vapor or hydrogen in an atmosphere.

In addition to the above, many devices have been developed which operate on density, diffusion or thermal conductivity principles, or which detect and estimate specific gases such as carbon monoxide.

Factors Determining Suitability of Apparatus for Gas Detection Purposes

An apparatus to find broad application in the gas industry for detecting contaminating gases in atmospheres at the location where they occur should be capable of indicating:

(a) Whether an atmosphere is safe for entry.
(b) Whether an atmosphere presents an explosive hazard.
(c) The kind of gases other than air present, as a means of determining the source of contamination.

From the standpoint of safety of entry, it is necessary to determine that the atmosphere does not contain toxic gases in hazardous concentration and that the concentration of oxygen is sufficient to sustain respiration. Carbon monoxide is the most toxic of the gases normally encountered and the detection method should be capable of indicating its presence in concentrations of the order of 0.05 per cent,[11] since even this low concentration will cause serious physiological disturbances upon prolonged exposure. Other toxic constituents which may normally be met include gasoline, naphtha, and benzol or other light oil vapors, but the toxic concentrations of these are of such larger magnitude that it is believed that a detection method that would show the presence of 0.15 per cent[12] of combustible gas in air would prove adequate. Ammonia, hydrogen sulphide and sulphur dioxide are other toxic gases encountered in some operations, but these gases are usually less important than carbon monoxide. Ammonia and sulphur dioxide are pungent and irritating, so that a person avoids them instinctively. Hydrogen sulphide has an odor like rotten eggs, and is very poisonous. High percentages of hydrogen sulphide may not be recognized because this gas paralyzes the olefactory nerve at the first whiff.[13] A detection method should be capable of indicating the

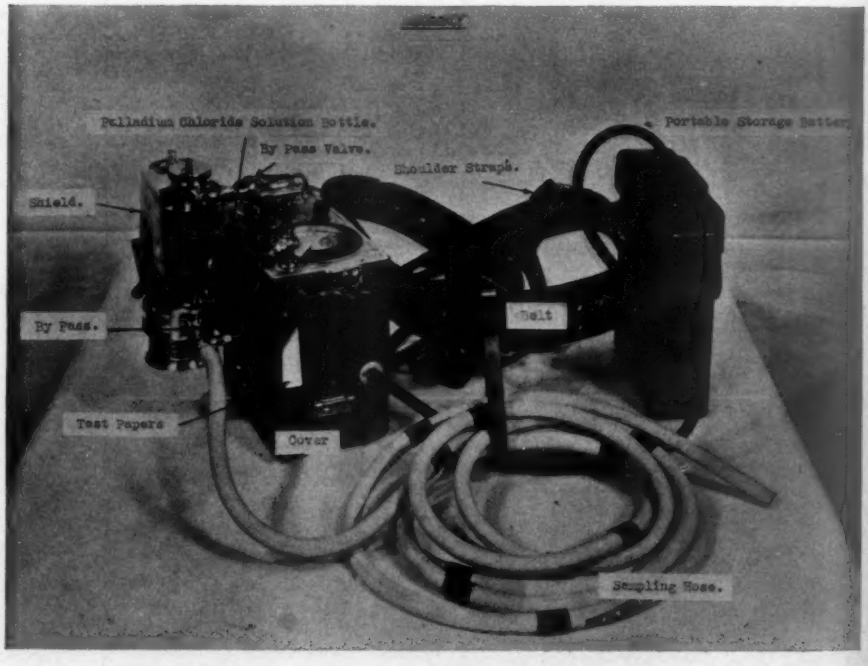


Figure 2

presence of 0.02 per cent[14] of hydrogen sulphide, as this amount will cause physiological disturbances on prolonged exposure.

Carbon dioxide is generally not classed as poisonous and its asphyxiating effect is primarily associated with its substitution for oxygen in the air. A person can breathe[15] air containing 3% to 4% carbon dioxide with no greater discomfort than an increase in the rate of breathing. At 5% the breathing becomes laborious and 6%[15] is regarded as the critical point. Man is sufficiently adaptable to get along fairly well in an atmosphere containing 17% of oxygen, provided toxic gases and vapors are absent. In so far as carbon dioxide is concerned then, the detection method need only determine that the atmosphere is not so deficient in oxygen as to cause discomfort.

In determining the safety of an atmosphere with respect to an explosive hazard, it is necessary to know whether combustible gases are present in concentration approaching or exceeding the lower explosive limit, and whether sufficient oxygen is present to support combustion. The presence of abnormal quantities of inert gas, such as carbon dioxide or nitrogen, narrows the explosive range. The presence of combustible gas in concentration above the upper explosive limit becomes a hazard upon mixture with air, as in ventilating operations. To be entirely satisfactory from the standpoint of explosion hazard, the means selected should be capable of determining the combustible gas concentration in an atmosphere with reference to the lower explosive limit, regardless of what the particular combustible gas or vapor may be, and of showing that sufficient oxygen is present in or may be added to the atmosphere to form an explosive mixture.

Identification of the kind of combustible gases present, and their source, can be obtained by the use of some form of gas analysis, but most methods of gas analysis are time consuming and not desirable for field use if simpler methods of identification are available. To differentiate between manufactured fuel gases and combustible gases from other sources, advantage may be taken of the fact that all the usual manufactured fuel gases distributed in the United States contain carbon monoxide, which will serve as an indication. It should be borne in mind, however, that the presence in an atmosphere of carbon monoxide does not constitute proof of the presence of manufactured fuel gas, but merely an inferential indication, since carbon monoxide is a constituent of other industrial gases, such as the exhaust gas of automotive engines or the gas generated through the breakdown of certain electrical insulation materials.

Figure 3

Other practical requirements of an instrument for use in the field are that it should be compact and of minimum weight; that it should be capable of being carried from the body in such a manner as not to encumber the wearer; that it should be capable of speedy detection of the atmosphere condition; that the operation be simple and safe; and that it produce results which may be readily interpreted.

Limitations of Various Types of Gas Detectors

The limitations of the various types of gas detectors or indicators in field service are summarized below from the viewpoint of the suitability requirements just reviewed.

The carbon monoxide detectors, as the term implies, are intended to indicate the presence of carbon monoxide and, with certain types of devices, the concentration as well. They do not indicate the kind or concentration of other combustible or toxic gases that may be present, nor do they show whether an oxygen deficiency exists.

Flame safety lamps will indicate whether an atmosphere is deficient in oxygen and whether combustible gases are present. In the case of oxygen deficiencies the lamp flame shortens as the oxygen content of the atmosphere becomes progressively lower, and is extinguished when the concentration of oxygen is reduced to 17 per cent or less. In the presence of combustible gas, the flame elongates as the lower explosive limit concentration is approached, and is extinguished approximately at the lower explosive limit concentration. However, these lamps give no information as to the toxicity of a suspected atmosphere, or as to the kind of gas present. They also have two objectionable features from the standpoint of safety when used in field service where unknown gases are likely to be encountered; namely, the need for placing the lamp into the body of an atmosphere in order to make a test, and the fact that the safety screens are ineffective in preventing flame propagation when certain combustible gases are present.

Combustible gas indicators of the hot wire type determine the content of combustible gas in an atmosphere in approximate percentage of the lower explosive limit, provided the atmosphere contains an ample excess of oxygen over that required to effect complete combustion of the gas present. They indicate the true concentration of combustible gas only when the kind of gas present is known, but do not detect an oxygen deficiency; nor do they indicate the presence of toxic gas, or the kind of combustible gas in an unknown atmosphere.

Detectors dependent on explosibility will indicate whether the concentration of combustible gas in an atmosphere is within the explosive range, below the lower ex-

plosive limit, or above the upper explosive limit, and whether the atmosphere is deficient in oxygen. They do not indicate the kind of combustible gas present or the toxicity of the atmosphere.

Devices depending upon the contraction produced on combustion of the suspected atmosphere indicate the concentration of the combustible gas they are calibrated for, provided sufficient oxygen is present to support its combustion. They do not detect an oxygen deficiency, nor do they indicate the toxicity or kind of combustible gas present in an unknown atmosphere.

Density, diffusion, refraction and thermal conductivity apparatus indicate the concentration of the gases they are calibrated for. Their accuracy depends largely on the magnitude of the difference between the density, rate of diffusion, refractive index or thermal conductivity of the gas under detection, and air. These devices do not differentiate between combustible and non-combustible gases, and furnish no information regarding the explosibility or toxicity of an unknown atmosphere.

Devices dependent on the measurement of the heat developed when combustible gases are brought into contact with catalytic materials, determine the concentration of the gas for which they are calibrated, but do not indicate the explosibility, toxicity or kind of gas present in an unknown atmosphere.

These limitations are not to be interpreted as indicating that the above instruments are not serviceable for particular purposes. For example, the flame safety lamp has been used by several utility companies for the detection of natural gas in manholes. These companies and the maker of the lamp have recognized however, that the introduction of the lamp into an atmosphere containing combustible gases of relatively high hydrogen content is likely to cause an explosion and have stated that the lamp shall not be used under such conditions. To avoid the necessity for placing the safety lamp into the body of atmosphere under test, the Utility Survey Commission of Greater Pittsburgh designed a sheet metal base for use with the lamp in testing the atmospheres of manholes and street openings. This base surrounds the lower part of the lamp, and is provided with a tube on the bottom which is inserted into the atmosphere to be tested. By using the base, the atmosphere under test is drawn into the flame chamber of the lamp and its effect on the flame characteristics may be observed.

Explosibility apparatus has been used with marked success in the testing of manhole atmospheres in Boston, Mass.,[26, 27] where comprehensive survey work has been in progress for the past few years.

Combustible gas indicators of the hot wire type, and carbon monoxide detectors, particularly the palladium chloride ampoule, have also been used with considerable success in similar services.

Development of a Gas Indicator Having General Utility

The individual limitations of the gas detection instruments previously described led the company with which the writer is connected to undertake the development of a combination of detection instruments which would indicate whether an atmosphere is safe for entry, whether it contains combustible gases in concentration presenting an explosive hazard, whether combustible gases if present are the product of gas manufacturing processes, and at the same time fulfill the practical requirements as to weight, portability, safety and simplicity of operation. The result has been a

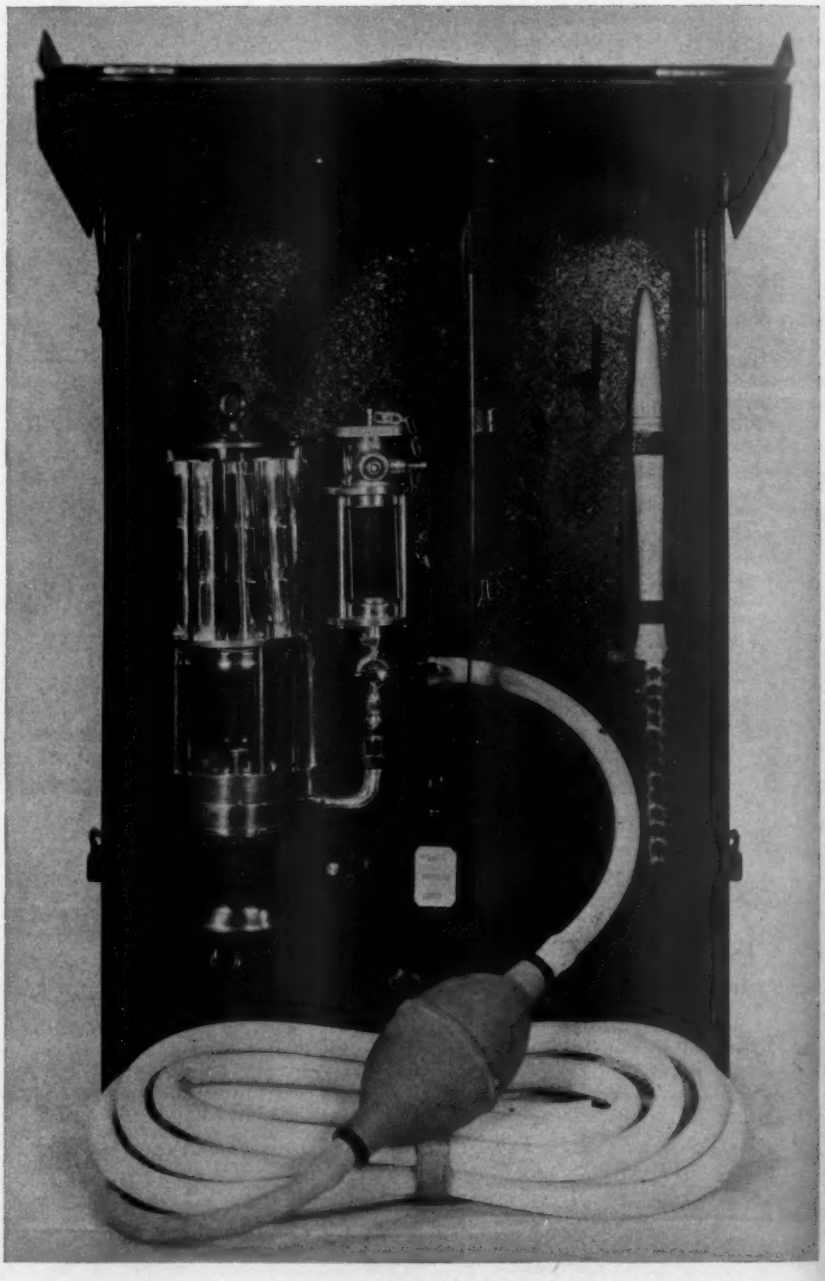


Figure 4

combination of a carbon monoxide detector, a combustible gas indicator of the hot wire type, and a wick-type flame safety lamp of special design. Provision is made for aspirating the atmosphere to be tested from its source, and the detection apparatus is fitted with adequate flame arrestors to prevent propagation of flame to the main body of the atmosphere.

This combination has been used in the Company's service for the past two years and has met its varied needs satisfactorily. During this period the apparatus has undergone various refinements which are embodied in the present apparatus. Its applications have included the determination of atmosphere conditions in confined spaces such as manholes, tanks, and the space above the piston of waterless holders; the location of the point of leakage from gas mains in connection with bar hole surveys; and the determination of the end point in purging operations involving the displacement of flammable gas by means of inert gases.

Figures 1 and 2 show two views of the instrument, and Figure 3 shows how it is carried from the shoulders of the observer when ready for use.

The apparatus is assembled so that the atmosphere under test is drawn in turn through the sampling hose, the carbon monoxide detector chamber and combustible gas indicator, and forced into the flame space of the safety lamp by means of an aspirator bulb located between the combustible gas indicator and safety lamp.

The complete instrument weighs approximately 17 pounds. It is suspended from the shoulders by a leather harness in such a manner as to cause little discomfort even when carried throughout the day. Any reasonably intelligent person can be taught the use of this instrument in a day.

The carbon monoxide indicator is a piece of absorbent paper wetted at the time of use with a solution containing 2 per cent by weight of palladium chloride, which blackens on exposure to an atmosphere containing carbon monoxide to the amount of 0.05 per cent. It indicates the presence or absence of carbon monoxide in toxic concentration, but no attempt is otherwise made to interpret the finding quantitatively. The palladium chloride test paper is also discolored[15] by the presence in an atmosphere of 0.01 per cent or more of hydrogen sulphide, 10 to 15 per cent or more of gasoline vapor, 1 per cent or more of ethylene or 5 per cent or more of hydrogen. Lead acetate solution has been used successfully in the indicator to differentiate between carbon monoxide and hydrogen sulphide.

The combustible gas indicator is of the hot wire type. The value of this type of combustible gas indicator is due to the fact that it will indicate the relative explosibility of a mixture of the common flammable gases and air with respect to the lower explosive limit, regardless of what the lower explosive limit of the particular flammable gas present may be. It is necessary to have present in the mixture an ample excess of oxygen over that required to support combustion. The principle upon which the combustible gas indicator of the type selected operates depends upon the fact that the burning of a combustible gas on the surface of a heated metallic filament causes an increase in its electrical resistance. The heated filament is connected in one arm of a balanced Wheatstone Bridge circuit. When the filament is exposed to a combustible gas-air mixture, the resultant combustion throws the electrical circuit out of balance and current flows through the galvanometer, causing a deflection of the needle. The magnitude of the deflection is approximately proportional to the concentration of the combustible component and is indicated on a scale that is graduated with reference to the explosibility of the mixture.

The scale of the instrument illustrated is divided into 15 major divisions, which permits calibration of the instrument with mixtures containing known amounts of any combustible gas in air in concentration below the lower explosive limit. To facilitate interpretation in the field, the scale is also colored white, yellow, orange and red. The white section (0 to 1) indicates that, for all practical purposes, the atmosphere is free of combustible gas. The yellow section (1 to 6) indicates that the atmosphere contains a nominal concentration of combustible gas. The orange and red sections indicate that the atmosphere contains a dangerous combustible gas content which approaches the lower explosive limit or is within the explosive range.

Figure 3

The wick-type flame safety lamp serves the double purpose of showing whether the atmosphere is deficient in oxygen for respiration, and whether it contains sufficient oxygen to give a true reading on the combustible gas indicator, since experiments have shown that a true reading will be obtained if the oxygen content is sufficient to support combustion of the lamp flame.

The lamp used in the indicator has been made suitable and safe for testing unknown atmospheres by replacing the usual air admission protecting ring with a special admission ring, designed to permit aspiration of the atmosphere to be tested into the combustion space of the wick flame.

Other important features of the combined apparatus are:

A shield is provided around the carbon monoxide chamber and the upper part of the flame

safety lamp which conducts the heat developed by the lamp to the carbon monoxide test chamber, thereby warming it and speeding the reaction between the palladium chloride and carbon monoxide, particularly in cold weather.

The test papers and palladium chloride solution bottle used for the carbon monoxide test are carried in convenient pockets on the combustible gas indicator.

The carbon monoxide test chamber is equipped with a by-pass so that a part of the sample may be trapped in the chamber and tested while observations are made with the combustible gas indicator and flame safety lamp.

The combustible gas indicator is equipped with effective flame arrestors at the inlet and outlet connections, which prevent propagation of flame to the main body of atmosphere under test, even though pure hydrogen be the combustible gas in the atmosphere.

The combustible gas indicator is provided with a three way device which permits the aspiration through the indicator of pure air, the atmosphere alone, or a mixture of air and the atmosphere under test. The air inlet of the three way device is equipped with a needle valve which allows control of the quantity of air admitted in mixture with the atmosphere under test. The simultaneous introduction of air with the sample is required when the concentration of combustible gas in the sample is greater than the lower explosive limit, and when the sample is deficient in oxygen, both of which conditions are indicated by the flame safety lamp.

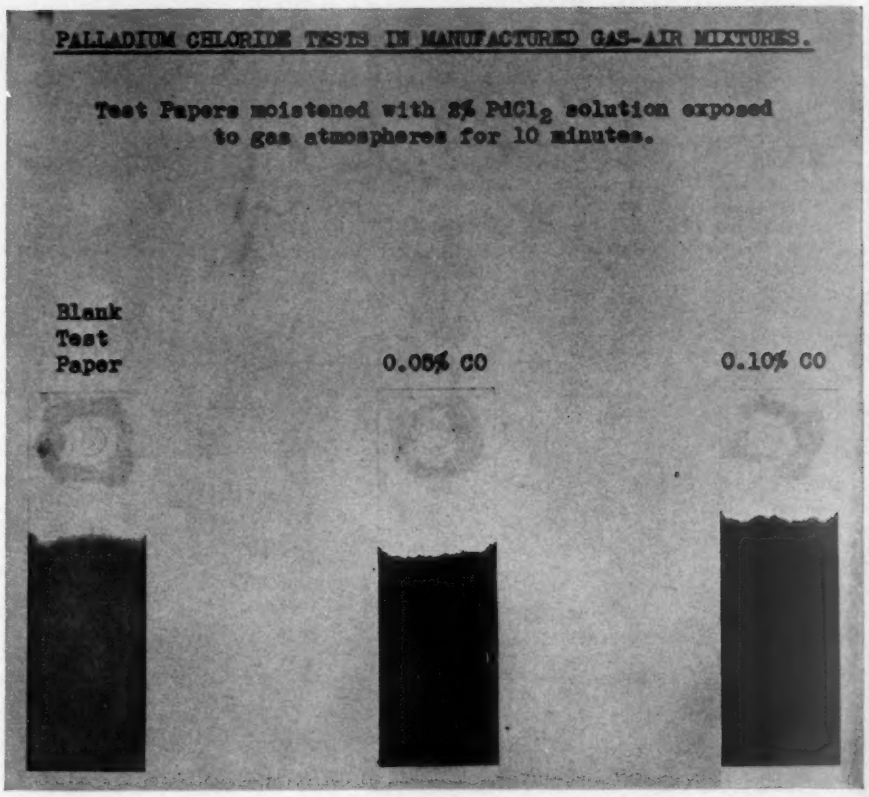

PALLADIUM CHLORIDE TESTS IN MANUFACTURED GAS-AIR MIXTURES.
Test Papers moistened with 2% $PdCl_2$ solution exposed to gas atmospheres for 10 minutes.
Blank Test Paper
0.05% CO
0.10% CO

Figure 6

Method of Using the Indicator

In use, the indicator is always operated in fresh air. The free end of the sampling hose is placed at the point where tests are desired. The atmosphere is aspirated through the apparatus. Observations are made of the action of the lamp flame and of the combustible gas indicator reading, and the color of the test paper after 10 minutes' exposure is compared with a freshly wetted test paper. From these observations an interpretation may be made of the con-

TABLE I

INTERPRETATION OF OBSERVATIONS

Condition	*Safety Lamp Flame Characteristics*	*Combustible Gas Indicator*		*Palladium Chloride Test Paper*	*Atmosphere Condition Indicated*
		Indicator Reading	*Color of Scale*	*Color Change After 10 Minutes*	
1	Flame burns at normal height.	0 to 1.	White.	No change in color.	Safe for Entry. Air, substantially free from combustible gases.
2	Flame tends to lengthen and may extinguish. (Note 1)	Higher than 6.	Orange or Red.	Color changes to black.	Unsafe for Entry. Combustible gas indicated in concentration approaching or exceeding lower explosive limit. Carbon monoxide indicated.
3	Flame tends to lengthen and may extinguish. (Note 1)	Higher than 6.	Orange or Red.	No change in color.	Unsafe for Entry. Combustible gas indicated in concentration approaching or exceeding lower explosive limit.
4	Flame burns with no significant change in length.	1 to 6.	Yellow.	Color changes to black.	Unsafe for Entry. Combustible gas indicated in nominal concentration. Carbon monoxide indicated.
5	Flame burns with no significant change in length.	1 to 6.	Yellow.	No change in color.	Unsafe for Entry. Combustible gas indicated in nominal concentration.
6	Flame shortens and is extinguished. (Note 1)	0 to 1.	White.	No change in color.	Unsafe for Entry. Atmosphere deficient in oxygen, substantially free from combustible gas.

Note 1. When the flame is extinguished, and the Combustible Gas Indicator reading is lower than 10, admit air and the sample under test to the combustible gas indicator and observe whether the reading is increased thereby. Record the maximum combustible gas indicator reading obtained (either before or on admission of air).

dition of the atmosphere as indicated in Table 1.

The following examples will illustrate the application of this table:

CONDITION 1. The burning of the safety lamp flame at normal height in the sample of atmosphere, concurrently with a combustible gas indicator reading in the white section of the scale and with no change in the color of the palladium chloride test paper are an indication that the sampled atmosphere is safe.

CONDITION 2. The lengthening and extinguishing of the safety lamp flame, concurrently with a combustible gas indicator reading in the orange or red section of the scale and the blackening of the palladium chloride test paper, indicate the double hazard of combustible gas in concentration approaching or exceeding the lower explosive limit and the probable presence of carbon monoxide in toxic quantity.

CONDITION 3. The same flame characteristics and combustible gas indicator reading, but with no change in the color of the palladium chloride test paper, indicate a similar concentration of combustible gas but shows the absence of carbon monoxide.

CONDITION 6. The shortening and extinguishing of the safety lamp flame, concurrently with a combustible gas indicator reading in the white section of the scale and with no change in the color of the palladium chloride test paper, indicate the atmosphere is practically free of combustible gas but is deficient in oxygen and hence irrespirable.

Since certain combustible gases which do not react with palladium chloride are toxic, it is believed desirable to consider any unknown atmosphere irrespirable which shows a combustible gas indicator reading in the yellow, orange or red section of the scale.

In cases where it is desired only to determine whether an atmosphere contains carbon monoxide or hydrogen sulphide, and whether it is deficient in oxygen or contains combustible gas, but where knowledge of the concentration of combustible gas is not required, a combination of the modified safety lamp and carbon monoxide-chamber, as illustrated in Figure 4 should prove useful.

Should only information be desired as to the presence of an oxygen deficiency or of combustible gas, the modified flame safety lamp shown in Figure 5 will meet the requirements.

The lamp in both of these devices is provided with an effective flame arrestor.

These three indicators: the combination of the carbon monoxide detector, the combustible gas indicator and the modified flame safety lamp; the combination of the carbon monoxide detector and the modified flame safety lamp; and the modified flame safety lamp alone, permit the selection of an instrument for a specific purpose at a minimum of cost.

EXPERIMENTAL TESTS

Carbon Monoxide Indicator

Solutions containing concentrations of palladium chloride ranging from 1 per cent to 5 per cent by weight have been tested periodically over a period of four months to determine their stability and sensitivity in indicating toxic quantities of carbon monoxide in an atmosphere. These solutions are now just as sensitive as when first prepared. Figure 6 shows three test papers which were prepared with the solution containing 2 per cent by weight of palladium chloride. The second and third papers were exposed for 10 minute periods to atmospheres containing 0.05 per cent and 0.10 per cent respectively, of carbon monoxide, and the first paper, which is included for comparison, has not been exposed. This test indicates the extent to which these concentrations of carbon monoxide blacken the papers.

Solutions containing 4 per cent and 5 per cent by weight of palladium chloride will indicate the presence of carbon monoxide in a somewhat shorter time than the 2 per cent solution, but since they are somewhat darker in color, the color change in low concentrations of carbon monoxide, while thoroughly distinguishable, is not as pronounced.

Tests have also shown that the addition of sufficient glycerine or ethylene glycol to the palladium chloride solution to prevent freezing at 0° F. does not appreciably affect the sensitivity.

Combustible Gas Indicator

The type of combustible gas indicator selected will indicate, for a mixture of the common flammable gases in air, when the concentration of gas approaches or exceeds the lower explosive limit concentration, regardless of what the lower explosive limit of the particular gas may

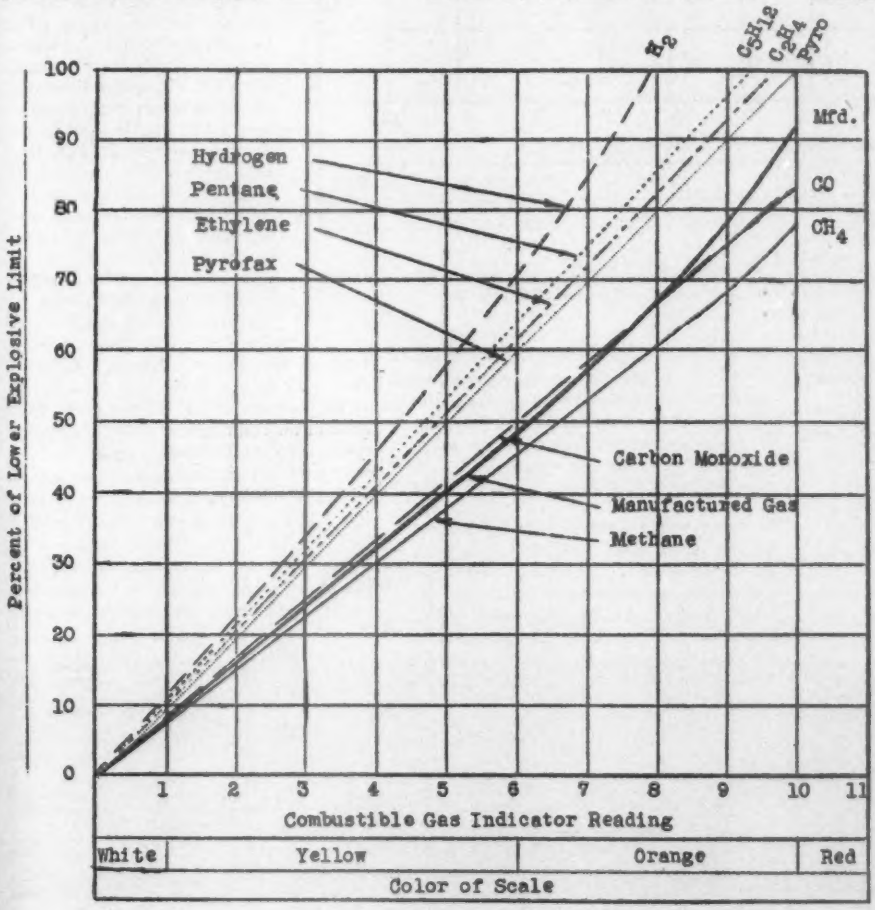


Figure 7

Results obtained on testing prepared mixtures of selected combustible gases and air with combustible gas indicator

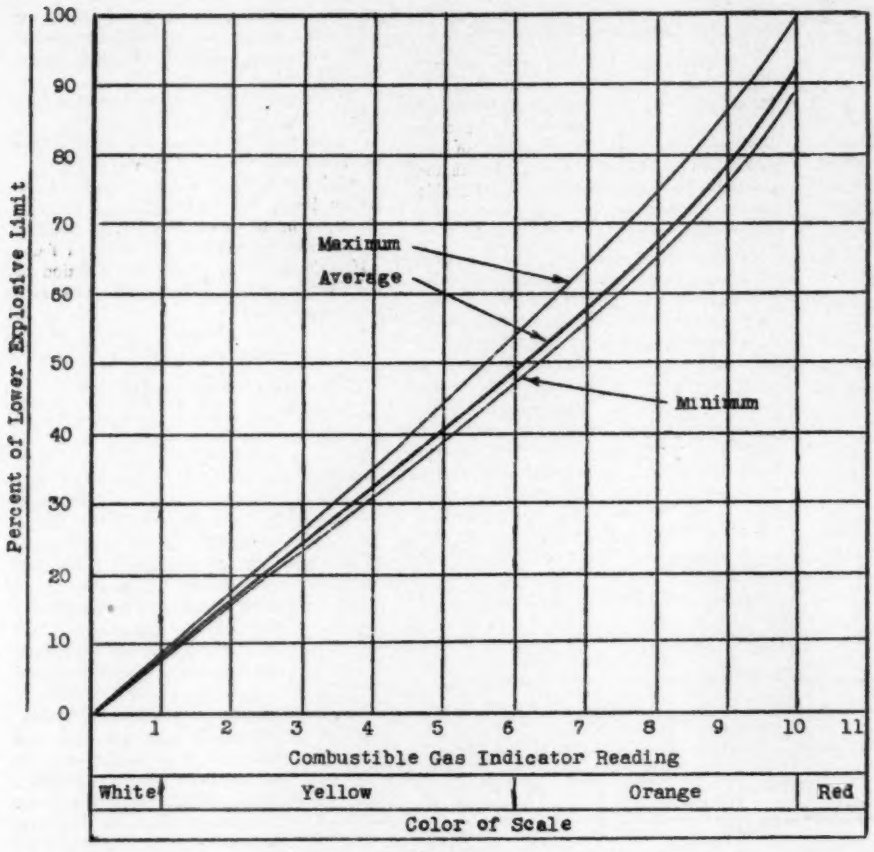


Figure 8

Comparison of maximum, minimum and average results obtained on testing eight combustible gas indicator filaments in prepared mixtures of manufactured gas and air

Gas	*Analysis*		*Lower Explosive Limit Conc. in Air*
Carbon Monoxide	CO	97.8 %	12.5 %[19]
Ethylene	C_2H_4	99.2 %	3.0 %[19]
Hydrogen	H_2	99.7 %	4.1 %[19]
Methane	CH_4	98.8 %	5.3 %[19]
Pyrofax	C_3H_8	97.0 %	2.4 %[19]
Pentane	C_5H_{12}	100.0 %	1.45 %[19]
Manufactured Gas	CO_2	2.90 %	6.3 %
	Ill.	7.70 %	
	O_2	0.85 %	
	CO	17.50 %	
	H_2	35.90 %	
	CH_4	14.95 %	
	C_2H_6	0.90 %	
	N_2	19.30 %	

be. Tests were made on mixtures of air containing known amounts of carbon monoxide, ethylene, hydrogen, manufactured gas, methane, pentane and commercial propane (Pyrofax) in concentrations up to their respective lower explosive limits. Methane, pentane and Pyrofax were selected because they are representative of natural gas, gasoline and propane or butane, respectively. Ethylene is an unsaturated hydrocarbon simulating the illuminants of manufactured fuel gases, and hydrogen, carbon monoxide and methane are principal constituents of manufactured gases.

The above table shows the analyses of the gases tested and their approximate lower explosive limit concentrations in air.

Figure 7 shows the results obtained on testing the prepared mixtures of these gases and air with the combustible gas indicator. It is to be particularly noted that the readings obtained with the indicator for the mixtures containing lower explosive limit concentrations of each of these gases in air, lie either within the orange or red colored sections of the meter scale, which indicates the presence of a dangerous combustible gas content approaching or exceeding the lower explosive limit concentration. This indication is adequate for the purposes of the usual field testing work where unknown combustible gas mixtures may be encountered. However, when the indicator is employed for testing mixtures containing a known combustible gas, an accurate determination of the concentration present can be obtained by reference to a calibration curve similar to those in Figure 7.

The hot wire or filament is the part of the combustible gas indicator, the characteristics of which are most likely to vary and affect the accuracy of the instrument. To obtain an idea of these characteristics, eight new filaments were tested in mixtures of manufactured gas in air in several concentrations up to the lower explosive limit. Figure 8, compares the maximum, minimum and average readings obtained with these filaments and shows that the maximum deviation is equivalent to an accuracy of plus or minus 0.5 per cent of the manufactured gas tested.

The filament deteriorates with continued use, its effective life being terminated when its resistance increases to a point such that a zero scale adjustment cannot be made in fresh air. The life of the filament is dependent upon the concentrations of flammable gases in the atmospheres tested, but tests have shown that the type of filament used will give satisfactory performance in usual testing work for about 25 or 30 operating hours.

The use of the combustible gas indicator in field service requires that it be capable of operating reliably over a wide range of temperature. Figure 9 compares the results of tests made with the indicator at temperatures of 75° F. and 0° F. Mixtures of air and methane in various concentrations up to the lower explosive limit were used in these tests, which indicate that while the readings at 0° F. were slightly lower than at 75° F., the accuracy was of the order of 0.4 per cent of methane.

The effect of high concentrations of carbon dioxide and nitrogen on the accuracy of the combustible gas indicator has also been determined. These test data are summarized in the Table No. 2 in comparison with the concentrations of manufactured gas in mixture with air alone, giving the

TABLE 2

Composition of Mixture, % by Vol.				*Combustible Gas Indicator Reading*	*Con. of Mfd. Gas in Mixture with Air, Giving Same C. G. I. Reading*	*Difference in Indicated Con. of Mfd. Gas, % by Vol.*
		Inert Gas				
Mfd. Gas	*Oxygen*	*Nitrogen*	*Carbon Dioxide*			
2.10	12.00	85.90		3.7	1.9	0.20
2.65	10.50	86.85		5.6	2.9	0.25
5.05	11.40	83.55		9.1	5.2	0.15
2.15	12.00	45.45	40.40	4.1	2.1	0.05
3.85	10.45	39.45	46.25	7.5	4.0	0.15
5.70	9.30	35.20	49.80	10.2	6.0	0.30

same combustible gas indicator readings.

The data show that the combustible gas indicator will determine the concentration of manufactured gas in an atmosphere containing high concentrations of inert gas with an accuracy of plus or minus 0.3 per cent, when the oxygen content of the mixture is about 10 per cent.

Experiments have also been made to establish the effectiveness of the flame arrestors used with the combustible gas indicator and the flame safety lamp in preventing the propagation of an explosion. Mixtures of hydrogen and air, representing compositions throughout the explosive range, were aspirated through the combustible gas indicator with the filament at operating temperature, and through the safety lamp with the flame burning. In no case did the explosion travel through the flame arrestors. Hydrogen was selected for these tests because its rate of flame propagation is much higher than for the other common combustible gases.

Flame Safety Lamp

The modified flame safety lamp has been tested for flame characteristics in the presence of an oxygen deficiency and combustible gas concentrations exceeding the lower explosive limit, and proved suitable for indicating both of these conditions.

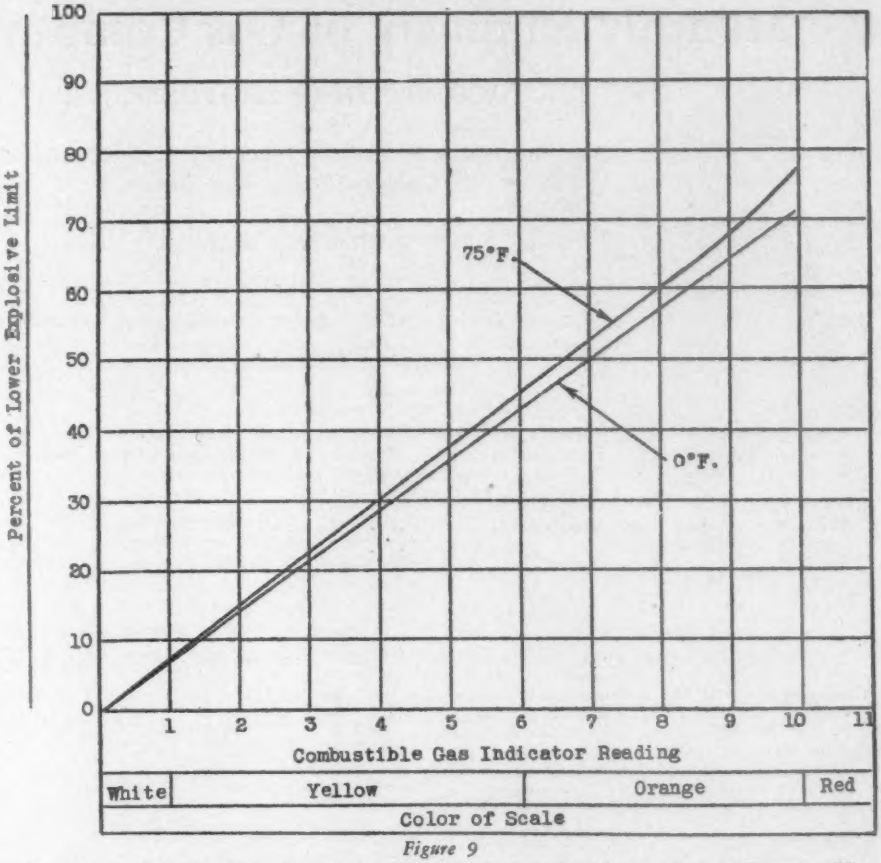


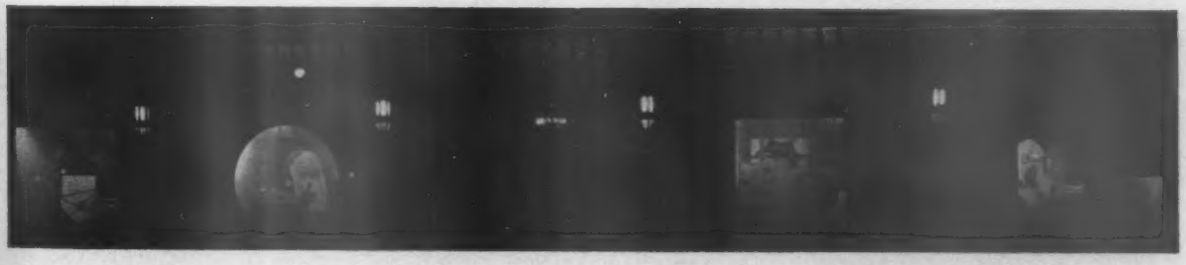
Figure 9

Comparison of results obtained on testing prepared mixtures of methane and air with combustible gas indicator at temperatures of 75° F. and 0° F.

BIBLIOGRAPHY

[1] Colliery Engineer and Metal Miner, vol. 17 (1897), p. 223.
[2] U. S. Bureau of Mines Bulletin 227 (1924), p. 6.
[3] Idem, p. 7.
[4] Phil. Trans. Royal Soc., London, 1816, part 1, pp. 1-24.
[5] U. S. Bureau of Mines Bulletin 227, 1924, p. 16.
[6] Trans. Instn. North of England Mining Engr., vol. 27 (1878), p. 287; and vol. 28 (1879), p. 167.
[7] U. S. Bureau of Mines Bulletin 331, p. 5.
[8] U. S. Patent No. 524, 368 (1894).
[9] Trans. Am. Inst. Min. Eng., vol. 22 (1894), p. 725.
[10] Journ. Ind. Eng. Chem., vol. 8 (1916), p. 365.
[11] U. S. Bureau of Mines Tech. Paper No. 248 (1921); International Critical Tables, vol. II (1927).
[12] Henderson & Haggard, Noxious Gases, A. C. S. Monograph No. 35 (1927). Data for Benzol. U. S. Public Health Bulletin No. 185 (1925). Data for Gasoline.
[13] U. S. Bureau of Mines Report of Inv. No. 6009 (1926).
[14] International Critical Tables, vol. II (1927).
[15] U. S. Naval Medical Bulletin, vol. 28 (1930), p. 523-53; and p. 721-33.
[16] U. S. Bureau of Mines Report of Inv. No. 3109 (1931).
[17] U. S. Bureau of Mines Report of Inv. No. 3192 (1932).
[18] U. S. Bureau of Mines Report of Inv. No. 3030 (1930).
[19] U. S. Bureau of Mines Bulletin 279 (1931).

Use of Windows for Novel Appeal During Holidays



Christmas shoppers in New York were struck with the unique arrangement of the display windows of the Consolidated Gas Company of New York. Four windows, each displaying attractive gas appliances were deftly arranged so that the observer of the whole could read NOEL. The skillful arrangement produced much favorable comment and attracted unusual attention

Monthly Summary of Gas Company Statistics

FOR MONTH OF SEPTEMBER, 1933

Issued November, 1933, by the Statistical Department of the American Gas Association
420 Lexington Avenue, New York, N. Y.

PAUL RYAN, Statistician

COMPARATIVE DATA ON THE MANUFACTURED AND NATURAL GAS INDUSTRY FOR THE MONTH OF SEPTEMBER

	Month of September			Nine Months Ending September 30		
	1933	1932	Per cent Change	1933	1932	Per cent Change
Customers						
Domestic (Including House Heating)	14,466,800	14,687,100	— 1.5			
Industrial and Commercial	931,600	942,100	— 1.1	*See September*		
Total	15,398,400	15,629,200	— 1.5			
Revenue (Dollars)						
Domestic (Including House Heating)	34,267,100	36,167,900	— 5.3	368,967,200	399,168,600	— 7.6
Industrial and Commercial	14,532,900	13,706,200	+ 6.0	138,091,400	143,891,600	— 4.0
Total	48,800,000	49,874,100	— 2.2	507,058,600	543,060,200	— 6.6

COMPARATIVE DATA ON THE MANUFACTURED GAS INDUSTRY FOR THE MONTH OF SEPTEMBER, 1933

Customers						
Domestic	9,455,500	9,659,000	— 2.1			
House Heating	49,900	48,600	+ 2.7			
Industrial and Commercial	483,500	487,800	— 0.9	*See September*		
Miscellaneous	7,700	7,200	—			
Total	9,996,600	10,202,600	— 2.0			
Gas Sales (MCF)						
Domestic	20,532,000	21,899,400	— 6.2	185,222,900	201,312,000	— 8.0
House Heating	267,200	218,600	+22.2	15,215,800	15,572,200	— 2.3
Industrial and Commercial	6,648,400	5,949,000	+11.8	60,473,700	61,530,200	— 1.7
Miscellaneous	130,900	146,300	—	1,355,700	1,448,800	—
Total	27,578,500	28,213,300	— 2.3	262,268,100	279,863,200	— 6.3
Revenue (Dollars)						
Domestic	24,866,300	26,726,800	— 7.0	221,463,300	243,042,800	— 8.9
House Heating	228,300	198,000	+15.3	10,510,700	11,662,500	— 9.9
Industrial and Commercial	5,342,100	5,374,800	— 0.6	50,127,800	54,855,100	— 8.6
Miscellaneous	97,000	105,100	—	977,400	1,022,800	—
Total	30,533,700	32,404,700	— 5.8	283,079,200	310,583,200	— 8.9

COMPARATIVE DATA ON THE NATURAL GAS INDUSTRY FOR THE MONTH OF SEPTEMBER, 1933

Customers						
Domestic (Including House Heating)	4,961,400	4,979,500	— 0.4			
Commercial	421,400	427,300	— 1.4			
Industrial	13,400	13,200	+ 1.5	*See September*		
Main Line Industrial	4,100	5,100	—19.6			
Miscellaneous	1,500	1,500	—			
Total	5,401,800	5,426,600	— 0.5			
Gas Sales (MCF)						
Domestic (Including House Heating)	8,458,400	8,508,800	— 0.6	196,097,400	206,153,700	— 4.9
Commercial	4,479,500	4,350,500	+ 3.0	62,769,700	63,113,300	— 0.6
Industrial	35,467,400	31,751,200	+11.7	258,184,900	251,973,600	+ 2.5
Main Line Industrial	9,427,700	7,549,100	+24.9	92,318,000	80,220,800	+15.1
Miscellaneous	1,005,300	455,700	—	6,702,900	6,436,700	—
Total	58,838,300	52,615,300	+11.8	616,072,900	607,898,100	+ 1.5
Revenue (Dollars)						
Domestic (Including House Heating)	9,172,500	9,243,100	— 0.8	136,993,200	144,463,300	— 5.2
Commercial	2,012,300	2,096,600	— 4.0	28,578,000	29,624,200	— 3.5
Industrial	5,975,100	5,223,600	+14.4	47,538,100	48,141,900	— 1.3
Main Line Industrial	964,200	827,100	+16.6	9,790,400	9,251,300	+ 5.8
Miscellaneous	142,200	79,000	—	1,079,700	996,300	—
Total	18,266,300	17,469,400	+ 4.6	223,979,400	232,477,000	— 3.7

Gas Sales Gain in September

SALES of manufactured and natural gas aggregated 86,416,800,000 cubic feet in September, an increase of nearly 7 per cent over the corresponding month of the preceding year.

In spite of augmented sales, however, revenues continued to lag, income for September amounting to $48,800,000 as compared with $49,874,100 in September a year ago, a decline of 2.2 per cent.

Most of the sales expansion of the industry was the result of pronounced increases in gas sales for industrial-commercial purposes, which averaged 14 per cent above the figures for September a year ago. Revenues from this class of business also gained, although not in proportion to increased volume, amounting to $14,532,900 in September as compared with $13,706,200 for the same month of the preceding year, an increase of 6 per cent.

While sales of manufactured gas for domestic cooking, water heating, refrigeration, etc., continued to run about 6 per cent below a year ago, sales for house heating purposes registered a sharp gain, amounting to more than 22 per cent over the preceding year. Manufactured gas sales for industrial-commercial uses were also above those of a year ago by nearly 12 per cent.

Natural gas sales for domestic uses during September about equalled those of a year ago, while sales to ordinary industrial customers were up 12 per cent. Sales to large scale industrial users of natural gas showed a gain of nearly 25 per cent over the same month of the preceding year.

Home Service Helps To Build and Retain Load in Philadelphia

(Continued from page 510)

sulted in an immediate gain in sales of gas ranges and other gas appliances."

With her staff of nineteen trained instructors, Miss Wagner conducts a regular course in practical cookery once each week at the company's principal showrooms. During the 1932-33 winter season more than 15,000 women attended these sessions and received valuable help on everyday cooking problems as well as suggestions for fancy or party menus. Most of the district offices also contain model kitchens, designed and equipped in the most modern manner, with home service representatives constantly in attendance to demonstrate appliances or consult with customers regarding menu planning, recipes, special diets and the like. This service is also extended to the customer's home, upon request.

Another of Miss Wagner's innovations this year is the "Table of the Month." Each month a table set for a special occasion is displayed for a period of four or five days on all sales floors where model demonstration kitchens are located. These tables feature such occasions as an "Easter Dinner Party," "Wedding Breakfast," "Fourth of July Garden Party," etc., according to season. Each is beautifully executed with silver and china of modish design. Copies of the menu and recipes introduced have been distributed to as many as 3,000 persons visiting a display.

The department also distributes through its sales floor kitchens each week a large number of printed recipe sheets containing recipes for new and appetizing dishes and daily menu suggestions. All recipes are thoroughly tested in the home service kitchen laboratory. A monthly bulletin of menu suggestions with complete recipes and timely hints by Miss Wagner is also published by the department and an elaborate new cookbook, illustrated in four colors, has been distributed to nearly 75,000 customers this year.

Newest of the home service division's many activities—and one that is unusual in many respects—is a "Kitchen Planning Headquarters." Located in the Architects Building, Philadelphia, and in charge of a graduate architect and interior decorator, this interesting display of modern gas equipped kitchens was opened to the public on September 23. Its purpose is to provide technical advice and assistance to customers seeking help in planning or remodeling kitchens as complete units. Collaborating with the gas company in sponsoring the service are numerous cabinet builders, floor- and wall-covering and kitchen appliance manufacturers whose products are exhibited in the four sample kitchens.

Pittsburgh Domestic Appliance Show

(Continued from page 509)

ple should be more easily sold on gas heat for cooking, water heating, house heating, refrigeration, incineration, etc. It is believed this idea can be profitably used to attract attention in windows displaying domestic gas appliances. Any commonplace item shown in the various stages of production, together with photographs of the gas equipment used in its manufacture, could be used in such windows. The industrial theme and the domestic appliance display could be tied together by stressing the same predominant appeal such as cleanliness, uniform heat, automatic control, or low cost, in each case. A small industrial exhibit of this nature would undoubtedly attract additional attention to the display windows and consequently the appliances on display.

Many gas men are beginning to believe this idea of featuring industrial gas applications to assist in holding and developing the domestic load, is worthy of further use since it increases the attention-getting possibilities of the domestic display and helps to sell the public on the use of gas, and last but not least, cultivates the good will of the industrial gas customers.

Table of Contents

Can Smoke Be Beautiful?
The Fires Are Lit
Full Blast
A Problem Becomes a Peril
The Challenge to Health
We Lose Our Sun
Women and Children First
A Threat to Property
The Waster of Cities
The Chimney—An Inverted Waste-Basket
"Smog" and the Weather
Flying Blind
Who Is to Blame?
The Health Department Starts Something
Warfare Is Organized
The Community Acts
Legal Aspects of Smoke Abatement
Problems of Enforcement
The Power of Persuasion
The Paraphernalia of Smoke Abatement
Measuring Sunlight and Dust
Mechanical Smoke-Eaters
Progress in Pittsburgh
More Progress
Organizing Public Opinion Against Smoke
Fuels and Firing
Principles of Furnace Care
The Shadow of the Shovel
Can It Be Done?

PRICES

A. G. A. Members

Single copies..... $2.25
Five copies..... 2.00
Ten or more copies..... 1.75

Non-Members

Single copies..... 2.50

American Gas Association
420 Lexington Ave.
NEW YORK, N. Y.

PUBLICITY AND ADVERTISING SECTION

HENRY OBERMEYER, Chairman ALLYN B. TUNIS, Secretary JOHN F. WEEDON, Vice-Chairman

Consolidated Gas Advertising in New York Again Merits High Award

Henry Obermeyer

FOR the second time within three years the advertising of the Consolidated Gas Company of New York has received the "Socrates' High Award," which is made annually by "Public Utility Ad-Views," a publication devoted exclusively to public utility advertising.

In making the announcement of the award, which covers the period from October, 1932, to October, 1933, "Public Utility Ad-Views" stated that "special recognition should be given at this time to the men who have made the excellence of Consolidated Gas advertising possible. To Henry Obermeyer, assistant to the vice-president, in charge of the advertising bureau and chairman of the Publicity and Advertising Section, American Gas Association; to Cyril Nast, manager, and to the members of Consolidated Gas Advertising Bureau, Socrates and his staff extend their heartiest congratulations.

"During the past twelve months Socrates and his staff of twelve advertising executives have checked and analyzed the advertising of several hundred public utility companies.

"Consolidated Gas Company has been singled out from this group to receive Socrates' high award of the year for four principal reasons, which the judges have summarized as follows:

"1. Consolidated Gas has developed institutional advertising to a new high level in the utility field. Their approach is educational, breaking down into four main types:

(a) depicting the important part that gas and electric service, and appliances, play in the life of average New Yorkers.

(b) showing the importance of gas and electric service to Science—and, as a corollary, the grave responsibility which therefore rests with gas and electric companies.

(c) sketching briefly the tremendous size of the company, the enormous amount of fuel and raw materials consumed, and the special equipment necessary to make possible consistent gas and electric service in New York.

(d) narrating true stories of personal service rendered by company employees, to sell the idea of a personal relationship existing between company and consumer.

"All four types of institutional advertising win a large audience from the most advertising-saturated people in the world, resident New Yorkers. Large-size, dramatic photographs invariably introduce the subject matter, which is quick-moving, interestingly written, and remarkably free from preachiness.

"2. Consolidated Gas does a thorough job of dealer-advertising. To plumbers, they use advertisements to dramatize ideal selling approaches to possible customers. To appliance dealers generally, they sell the wisdom of tying up with the Consolidated Gas dealer-seal, which is sold to the public in newspaper advertisements. And to apartment owners, they emphasize the rentability of completely appliances apartments. This appeal is carried through to its logical conclusion—a directory of gas refrigerated apartments, complete with picture, address and rent data, for benefit of apartment hunters.

"3. Consolidated Gas appliance advertising has certain definite characteristics which give it unusual effectivenes in selling-from-print.

(a) consistent use of photographs depicting human action and picturing the appliances. Practically every appliance photo shows at least two people for maximum interest.

(b) dialogue headings, referring directly to the photograph, pull eyes into the copy which sells with brief wordery.

(c) then for added selling-power, there is usually a mortised box at the bottom of the advertisement which summarizes the selling points for hurried eyes.

"4. In general appearance Consolidated Gas advertising shows expert handling. There's a uniformity that makes every Consolidated Gas advertisement recognizable as such at a glance. Yet the formats are essentially functional, with no typographic fripperies to distract eyes. The typography of their headings is worth close study. Few advertisers can put as much expression into type and hand lettering as Consolidated Gas."

A. F. Staniford, Half-Century With Brooklyn-Union, Is Dead

ARTHUR FOWLER STANIFORD, vice-president and director of the Brooklyn Union Gas Company, Brooklyn, N. Y., and an active member of the American Gas Association, died suddenly at his home in Ridgewood, N. J., November 11, at the age of sixty-nine years. He had been associated with the Brooklyn Union for more than a half-century.

A. F. Staniford

Mr. Staniford was born in Rockport, Mass., July 22, 1864, the son of the late Daniel and Caroline Staniford. The family moved to Salem, Mass., in 1868, and to Brooklyn in 1870. At the age of seventeen, he entered the employ of the Metropolitan Gas Light Co., on December 12, 1881, before it was made part of the Brooklyn Union. On July 14, 1885, he was appointed secretary. Seven years later he was elected a director and on January 2, 1895, was appointed to the office of secretary-treasurer.

During that year the gas companies of Brooklyn were acquired by The Brooklyn Union Gas Company, and Mr. Staniford was designated to handle the consolidation of the accounts of the various companies and to inaugurate an accounting system for the new company, in addition to serving as manager of the newly designated Metropolitan Branch.

Associations Affiliated with A. G. A.

Canadian Gas Association
Pres.—Donald G. Munroe, Montreal Coke & Mfg. Co., Montreal, Que.
Sec.-Tr.—G. W. Allen, 21 Astley Avenue, Toronto.

Empire State Gas and Electric Association
Pres.—Alfred H. Schoellkopf, Niagara Hudson Power Corp., Buffalo, N. Y.
Chairman, Gas Section—A. M. Beebee, Rochester Gas & Electric Corp., Rochester, N. Y.
Sec.—C. H. B. Chapin, Grand Central Terminal, New York, N. Y.

Illinois Public Utilities Association
Pres.—Bernard J. Mullaney, The Peoples Gas Light & Coke Company, Chicago, Ill.
Sec.—J. R. Blackhall, Suite 1213, 79 West Monroe St., Chicago, Ill.

Indiana Gas Association
Pres.—R. S. Brunner, Indiana Gas Utilities Co., Richmond, Ind.
Sec.-Tr.—P. A. McLeod, New Castle, Ind.

Michigan Gas Association
Pres.—Walter E. White, Commonwealth & Southern Corp., Jackson, Mich.
Sec.-Tr.—A. G. Schroeder, Grand Rapids Gas Light Co., Grand Rapids, Mich.

Maryland Utilities Association
Pres.—F. A. Mitchell, Eastern Shore Public Service Co., Salisbury, Md.
Sec.—D. E. Kinnear, 803 Court Square Bldg., Baltimore, Md.

Mid-West Gas Association
Pres.—R. L. Klar, Des Moines Gas Co., Des Moines, Iowa.
Sec.-Tr.—Roy B. Searing, Sioux City Gas & Electric Co., Sioux City, Iowa.

Missouri Association of Public Utilities
Pres.—Fred Karr, St. Joseph Gas Co., St. Joseph, Mo.
Sec.-Tr.—N. R. Beagle, Missouri Power & Light Co., Jefferson City, Mo.
Asst. Sec.—Jesse Blythe, 103 West High St., Jefferson City, Mo.

New England Gas Association
Pres.—H. R. Sterrett, New Haven Gas Light Co., New Haven, Conn.

Exec. Sec.—Clark Belden, 41 Mt. Vernon St., Boston, Mass.

Chairman, Operating Div.—P. R. Buchanan, Hartford Gas Co., Hartford, Conn.

Sec.-Tr., Operating Div.—D. R. Campbell, Portland Gas Light Co., Portland, Me.

Chairman, Sales Div.—H. B. Hall, Old Colony Gas Co., East Braintree, Mass.

Sec.-Tr., Sales Div.—R. J. Rutherford, Cambridge Gas Light Co., Cambridge, Mass.

Chairman, Industrial Div.—P. A. Nelles, Charles H. Tenney & Co., Boston, Mass.

Sec.-Tr., Industrial Div.—S. F. Morgan, New Bedford Gas & Edison Lt. Co., New Bedford, Mass.

Chairman, Accounting Div.—Leland Balch, Lowell Gas Light Co., Lowell, Mass.

Sec.-Tr., Accounting Div.—C. D. Perkins, Malden & Melrose Gas Light Co., Malden, Mass.

Chairman, Manufacturers Div.—C. H. Cummings, Industrial Appliance Co. of N. E., Boston, Mass.

Sec.-Tr., Manufacturers Div.—J. H. McPherson, James B. Clow & Sons, Boston, Mass.

New Jersey Gas Association
Pres.—F. A. Lydecker, Public Service Electric and Gas Co., Newark, N. J.

Sec.-Tr.—G. B. Webber, Public Service Electric and Gas Co., Newark, N. J.

Ohio Gas and Oil Men's Association
Pres.—L. K. Langdon, Union Gas & Electric Co., Cincinnati, Ohio.

Sec.-Tr.—Wm. H. Thompson, 811 First National Bank Bldg., Columbus, Ohio.

Oklahoma Utilities Association
Pres.—R. J. Benzel, Southwestern Bell Telephone Co., Oklahoma City, Okla.
Mgr.—E. F. McKay, 1020 Petroleum Bldg., Oklahoma City, Okla.

Pacific Coast Gas Association
Pres.—Geo. P. Egleston, H. R. Basford Co., San Francisco, Calif.
Mang. Dir.—Clifford Johnstone, 447 Sutter St., San Francisco, Calif.

Pennsylvania Gas Association
Pres.—A. J. Llewellyn, Luzerne County Gas & Electric Corp., Luzerne, Pa.
Sec.—Frank W. Lesley, Pennsylvania Gas & Electric Co., York, Pa.

Pennsylvania Natural Gas Men's Association
Pres.—F. F. Schauer, Equitable Gas Co., Pittsburgh, Pa.
Sec.-Tr.—B. H. Smyers, Jr., 435 Sixth Ave., Pittsburgh, Pa.

Southern Gas Association
Pres.—B. B. Ferguson, Portsmouth Gas Co., Portsmouth, Va.
Sec.-Tr.—S. L. Drumm, New Orleans Public Service Inc., New Orleans, La.

Southwestern Public Service Association
Pres.—Knox Lee, Southwestern Gas & Electric Co., Marshall, Texas.
Sec.—E. N. Willis, 1801 No. Lamar St., Dallas, Texas.

The Public Utilities Association of Virginia
Pres.—T. Justin Moore, Va. Elec. & Power Co., Richmond, Va.

Wisconsin Utilities Association
Pres.—R. G. Walter, Wisconsin Power & Light Co., Madison, Wis.
Exec. Sec.—J. N. Cadby, 135 West Wells St., Milwaukee, Wis.

16th Annual Convention and Exhibition
American Gas Association
◆
Atlantic City, N. J.
Week of
October 29, 1934

Personnel Service

SERVICES OFFERED

University graduate mechanical engineer with vision, initiative, imagination, creative ability and common sense; broad experience in **management**, sales, markets, contracts and negotiating; engineering plants, equipment, inventions and patents; business cycles, business indexes and economics; and in assembling, arranging and interpreting statistics, data and conditions. **785.**

Business developer (46), married. Technical education. Twenty years' experience in construction, engineering, manufacture, distribution, finance, management, sales and public relations. Wide experience. Build up property or develop sales per year per customer. Small or large property. Modest compensation. **792.**

Accountant—twenty-two years' utilities experience. Specialty is installation and reorganization (47). **793.**

Gas **appliance specialist,** with broad experience. For past two years intimately associated with design and development of new models; ideas for new sales features, new sales plans for dealers, new outlets for business. Has proven sales, advertising and promotional ability together with contacts that will be helpful in securing business. **794.**

Engineer, nine years' broad experience in public utility work, both gas and electric, covering **management,** valuation, gas analysis, construction estimates, operating improvements, marketing studies, rates, etc. **795.**

Services of experienced **appliance salesman** both through utilities and dealers, domestic and heavy duty, are offered. Wide acquaintance in the gas industry. Desire Eastern territory. Twenty-three years in the industry; fourteen years last position. Clean and successful sales record (38). Married. **797.**

Gas engineer, B.S. and M.S. in gas engineering, Purdue University. Three years' experience in utility work. Desire position in engineering, operating or sales (25). Married. Will go anywhere. **798.**

Appliance salesman seeking a substantial connection. Eighteen years' experience traveling Eastern and Southern territories, contacting wholesale and retail trade, also utility companies. Ambitious and hard worker experienced and capable of taking complete charge of a territory and selling organization. Have no preference as to location. Married and in the early forties. **799.**

Air conditioning. Graduate mechanical engineer 1932 desires position in air conditioning or heating field. Two years' experience in air conditioning, heating and ventilating in office and field. Has done some research work on Silica Gel Air Conditioning Systems. Will go anywhere. Salary secondary. **800.**

Sales manager with "punch" and aggressiveness, tempered with judgment and diplomacy. Exceptionally broad experience selling gas and electric service and appliances, handling salesmen and specialists, costs, rates, franchises, advertising, publicity, commercial and public relations. Can "pep-up" your organization, introduce efficient methods, and quickly develop new business potentialities. **801.**

Reduced income of gas companies requires better and more intelligent plant control to help maintain dividends. Experienced **gas engineer** can bring to your organization or company that technical and practicable aid necessary to further reduce operating expenses to a minimum. **802.**

Executive, **salesman,** stoves, furnaces, boilers and radiation. Over twenty-five years' experience, all general office details—credits, collections, sales promotion, sales customers claims and traffic. Wide acquaintance among furniture, hardware and department store trade in Northern Ohio and Michigan. Also conducted warm air heating business on own account for several years. **803.**

SERVICES OFFERED

Young engineering graduate with varied experience in design, manufacture, erection and operation of gas plant equipment, practical specialist in modern methods of **water gas** production engaged as supervisor of operation in plant of large city, desires similar employment in smaller community. Salary secondary. Married. **804.**

Technical graduate, 1931, single, specialized in gas and chemical engineering, with experience in several industrial concerns, also in testing **house heating** equipment; interested in development and experimental work, willing to go anywhere and to consider any position regardless of salary. **805.**

Gas engineer and manager, University graduate (45). Twenty-two years' experience in executive positions, including coal, oven and water gas, natural gas, high and low pressure distribution. **807.**

Gas engineer (34) technical graduate, several years broad experience with affiliated holding and operating companies in high and low pressure distribution, coal and water gas manufacture, natural and refinery gas, design and installation of distribution and transmission systems; specialist with excellent record of results in mitigation of unaccounted-for gas. **808.**

Young man with nine years' experience in **sales** and **engineering** work; seven years with one of the largest oil burner manufacturers, as assistant equipment manager and two years with manufacturer of gas industrial furnaces as an erection engineer. College graduate (M.E.). **809.**

Executive **printer** with exceptional knowledge of every phase of the business. Thoroughly familiar with all forms of advertising, commerical printing and lithography. Capable of planning to procure your requirements most economically. Employing this man does not involve any expense as his remuneration would be offset many times by savings effected. **810.**

Young **gas engineer,** technical graduate with six years' general experience, wants difficult job in gas production or distribution. **811.**

Manager. Thoroughly experienced in gas, natural gas and electric operation. Excellent record in New Business and in handling difficult properties. **812.**

Public relations (35). Thoroughly experienced in all phases of sales promotion, advertising and publicity; advertising agency training. Fourteen years' record available with highest credentials. U. S. government recognition for planning and advertising; available immediately. **813.**

Manufacturers Representative. Desires complete line of automatic gas fired water heaters, tank heaters, space heaters, ranges or other appliances, contacts the gas companies, plumbing supply jobber, plumber, architect, in New York City area, is well known, has covered this trade past fourteen years. **814.**

Executive and **sales** position. Thoroughly experienced gas utilization engineer, industrial house heating and domestic, nine years' experience in new business operations. **815.**

Controller, executive assistant, general **accountant,** charge of finances; twenty years' experience general and cost accounting; preparation and administration of budget; control of departmental operations; interim and annual statements; charts, graphs; supervision accounting department, personnel, correspondence, collections, adjustments; office management; purchasing; unemployment due to liquidation of firm; salary moderate; (46) married. **816.**

Market analyst (33) has recently completed supervision of house heating survey for gas company in large mid-western city, while employed by well-known concern of marketing counsellors. A highly successful campaign was executed and domestic sales increased sharply on basis of house heating study. Background includes practical engineering and marketing experience in other basic industries. **817.**

SERVICES OFFERED

As **superintendent** or **manager** of gas property by man having a number of years' experience in all branches of the gas business. Capable of taking charge of any plant, either coal, water or natural gas. **818.**

Executive **manager,** University man. Eighteen years' experience in the industry. Experience covers all phases of the business on coal, water and coke oven gas operations. Particularly successful with sales development on coke, house heating and refrigeration. Excellent public relations and employee personal record. Married. **819.**

Budget director; executive, engineering training, fifteen years' experience management gas and electric companies, qualified supervise preparation, operation, control of budgets. Practical background all branches gas and electric industry, understanding financial requirements, able to secure coordinated perspective for construction, operating and financial budgets. Can analyze costs, prepare explanatory reports on actual operations. **820.**

POSITIONS OPEN

Salesman, experienced in gas industry to sell newly patented culinary appliance through utilities and dealers; commission basis. **0262.**

Experienced **sales manager** for company serving southern city. Should know how to meet the public and be familiar with southern ways and conditions, with knowledge of up-to-date advertising and sales planning; one who can submit a proven and continuous record in selling or successfully directing a Sales Department of a gas company. Full information with respect to the foregoing should be furnished along with other essential details of personal and professional record. **0263.**

Competent, energetic and self-reliant **superintendent** for gas department of combination company; foreign service. Give full details of training and operating experience, including production, mentioning foreign languages spoken, size of family, etc. **0264.**

Gas appliance **salesmen** wanted. Those having utility sales experience preferred. We have an attractive proposition for men who can show a clean, successful record. Our product is outstanding in its field. Straight commission. No drawing account. Contracts for 1934 now being made. Desirable openings available in eastern and southern states. **0265.**

AN APPRECIATION

The two *Positions Open* advertised immediately above are the result of whole-hearted cooperation on the part of two important organizations. One, in returning confidential classification records "of various persons whom *you* thought might possibly fill the position we have in mind" authorized publishing an advertisement.

The other requested, when returning "the applications which you so kindly loaned us," that Personnel Service should "insert an advertisement to uncover possibilities among a wider group of men now unemployed."

Advisory Council

E. R. Acker.....Poughkeepsie, N. Y.
Jay Barnes.....New Orleans, La.
J. M. Bennett.....Philadelphia, Pa.
J. I. Blanchfield.....Brooklyn, N. Y.
R. B. Brown.....Milwaukee, Wis.
D. W. Chapman.....Chicago, Ill.
J. L. Conover.....Newark, N. J.
H. C. Cooper.....Pittsburgh, Pa.
J. D. Creveling.....New York, N. Y.
F. G. Curfman.....New York, N. Y.
E. S. Dickey.....Baltimore, Md.
Wm. A. Doering.....Boston, Mass.
R. G. Griswold.....New York, N. Y.
W. H. Hodge.....Chicago, Ill.
R. C. Hoffman, Jr.....Roanoke, Va.
D. F. Kahn.....Hamilton, Ohio
J. B. Klumpp.....Philadelphia, Pa.
C. C. Krausse.....Baltimore, Md.
A. B. Macbeth.....Los Angeles, Calif.
D. M. Mackie.....Jackson, Mich.
N. C. McGowen.....Shreveport, La.
F. A. Miller.....Bradford, Pa.
W. F. Miller.....Chicago, Ill.
I. K. Peck.....Boston, Mass.
A. E. Peirce.....Baltimore, Md.
J. A. Perry.....Philadelphia, Pa.
B. V. Pfeiffer.....Philadelphia, Pa.
C. R. Prichard.....Lynn, Mass.
Geo. W. Ratcliffe.....Pittsburgh, Pa.
J. M. Roberts.....Chicago, Ill.
Arthur Stockstrom.....St. Louis, Mo.
D. B. Stokes.....Burlington, N. J.
T. J. Strickler.....Kansas City, Mo.
F. S. Wade.....Los Angeles, Calif.
George E. Whitwell.....Philadelphia, Pa.
E. L. Wilder.....New York, N. Y.

AMERICAN GAS ASSOCIATION, INC.

HEADQUARTERS, 420 LEXINGTON AVE., NEW YORK, N. Y.

Officers and Directors

President	H. O. CASTER	New York, N. Y.
Vice-President	P. S. YOUNG	Newark, N. J.
Treasurer	WILLIAM J. WELSH	Staten Island, N. Y.
Managing Director	ALEXANDER FORWARD	New York, N. Y.
Assistant Manager	H. W. HARTMAN	New York, N. Y.
Secretary	K. R. BOYES	New York, N. Y.
Departmental Vice-Pres.	FRANK L. CHASE	Dallas, Texas
Sectional Vice-Pres.	HENRY OBERMEYER	New York, N. Y.
Sectional Vice-Pres.	E. B. NUTT	Pittsburgh, Pa.
Sectional Vice-Pres.	F. B. JONES	Pittsburgh, Pa.
Sectional Vice-Pres.	JOHN A. FRY	Detroit, Mich.
Sectional Vice-Pres.	O. S. HAGERMAN	Chicago, Ill.
Sectional Vice-Pres.	N. T. SELLMAN	New York, N. Y.

H. C. ABELL	New Orleans, La.	R. W. GALLAGHER	Cleveland, Ohio
WALTER C. BECKJORD	Boston, Mass.	ARTHUR HEWITT	Toronto, Ontario
HOWARD BRUCE	Baltimore, Md.	SAMUEL INSULL, Jr.	Chicago, Ill.
ADDISON B. DAY	Los Angeles, Calif.	CONRAD N. LAUER	Philadelphia, Pa.
J. S. DeHART, Jr.	Newark, N. J.	F. A. LEMKE	Kalamazoo, Mich.
B. J. DENMAN	Chicago, Ill.	B. J. MULLANEY	Chicago, Ill.
HENRY L. DOHERTY	New York, N. Y.	C. E. PAIGE	Brooklyn, N. Y.
O. H. FOGG	New York, N. Y.	W. FRANK ROBERTS	Baltimore, Md.
F. C. FREEMAN	Providence, R. I.	HERMAN RUSSELL	Rochester, N. Y.
T. R. WEYMOUTH	New York, N. Y.		

Section and Department Officers

NATURAL GAS—Chairman	FRANK L. CHASE	Dallas, Texas
Vice-Chairman	JOHN B. TONKIN	Pittsburgh, Pa.
Secretary	A. E. HIGGINS	Dallas, Texas
ACCOUNTING—Chairman	E. B. NUTT	Pittsburgh, Pa.
Vice-Chairman	A. S. CORSON	Philadelphia, Pa.
Secretary	H. W. HARTMAN	New York, N. Y.
COMMERCIAL—Chairman	N. T. SELLMAN	New York, N. Y.
Vice-Chairman	F. M. ROSENKRANS	Kansas City, Mo.
Secretary	J. W. WEST, Jr.	New York, N. Y.
INDUSTRIAL GAS—Chairman	F. B. JONES	Pittsburgh, Pa.
Vice-Chairman	J. F. QUINN	Brooklyn, N. Y.
Secretary	C. W. BERGHORN	New York, N. Y.
MANUFACTURERS—Chairman	J. A. FRY	Detroit, Mich.
Vice-Chairman	J. SCOTT FOWLER	Philadelphia, Pa.
Vice-Chairman	MERRILL N. DAVIS	Bradford, Pa.
Secretary	C. W. BERGHORN	New York, N. Y.
PUBLICITY AND ADVERTISING		
Chairman	HENRY OBERMEYER	New York, N. Y.
Vice-Chairman	JOHN F. WEEDON	Chicago, Ill.
Secretary	ALLYN B. TUNIS	New York, N. Y.
TECHNICAL—Chairman	O. S. HAGERMAN	Chicago, Ill.
Vice-Chairman	C. A. HARRISON	New York, N. Y.
Secretary	H. W. HARTMAN	New York, N. Y.

PRINTED IN THE U. S. A.